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This report summarizes the National Planning Association's pilot study of the implications of economic and social change for educational policy in the next two decades. Research is concentrated on changing manpower needs and on the challenges they are likely to present for designing the educational systems of the 1970's and 1980's. Anticipated changes in career opportunities provide a frame of reference for considering the consequences of rapid technological change, growth in leisure, and the persistence of poverty and discrimination for the options likely to become available in education during the coming decades. Chapter I sets the scope of the report into the analytical context used, while chapters II, III, and IV discuss the challenge to education of changing career opportunities, changing levels of educational attainment, and changing socioeconomic conditions. The educational system's response to socioeconomic change is analyzed in chapter V and is illustrated in chapter VI, which discusses institutional resistances to change in the area of educational technology. Supportive statistical tables are appended. A related document is EA 002 045. (TT)

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THE IMPLICATIONS OF SOCIAL AND ECONOMIC CHANGES FOR EDUCATIONAL POLICY IN THE NEXT TWO DECADES — A PILOT STUDY

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Center for Priority Analysis
National Planning Association
Washington, D.C.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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PREFACE

This report summarizes the National Planning Association's pilot study of the implications of economic and social change for educational policy in the next two decades. In the study NPA has concentrated its research on one aspect of these developments, changing manpower needs and the challenges they are likely to present for designing the educational systems of the 1970's and 1980's. For the purposes of a short pilot study, the anticipated changes in career opportunities have provided a frame of reference for considering the consequences of rapid technological change, growth in leisure, and the persistence of poverty and discrimination for the options likely to become available in education in the coming decades.

The finds of the pilot study are presented in the form of a summary report in this volume and in a number of working papers in a separate volume. Both the report and the working papers are concerned with the social and economic challenges to education and the potential responses of the educational system to these challenges. The working papers have provided an opportunity to explore relevant issues bearing on the theme of the study such as the role of systems analysis in educational planning, or education in low-income areas during the next two decades.

A study of so broad a scope is inevitably the product of the efforts of many persons and many agencies, public and private. The Office of Manpower Research of the Manpower Administration of the U.S. Department of Labor has kindly consented to the utilization of research findings developed in the course of NPA's study for the Manpower Administration, Manpower Requirements for National Objectives in the 1970's. The study owes much to the kindly guidance of Dr. Gerhard Colm, NPA's Chief Economist, and to the support of John Miller, NPA's Executive Secretary and Assistant Chairman. A number of persons from different fields have consented to serve as members of an advisory panel to the project, as readers of working papers, or as unofficial consultants in a host of problem areas. The persons who have contributed in this way are listed in Appendices 8 and 9. Needless to say, the errors of omission and commission in the report are the responsibilities of the NPA staff.

The staff for the project has consisted of a nucleus of full-time persons, and a number of part-time staff members and consultants. The enthusiasm of the staff, and their interest in the problem, has led in more instances than can be mentioned to participation beyond that which could be anticipated from a group of economists, educators, and sociologists drawn together on short notice and with many other commitments.

The staff members who have been associated with the project are as follows:

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The report concentrates on the substantive problem of the pilot study - future social and economic developments and their implications for education - rather than on NPA's concept of the role of an educational policy research center concerned with this problem. A discussion of NPA's concept of its role as a policy research center is included in the progress report submitted to the Office of Education in November, 1967. It is believed that the NPA effort can make its most useful contribution to educational policy research by making the findings of its study available as a means of encouraging further research by other research organizations including the policy research centers recently established by the U.S. Office of Education.

The experience in the pilot study has provided a welcome opportunity for the National Planning Association to think through many of the implications of on-going economic and social research in a new context - their significance for educational policy. The net effect of this research has been to underscore the conviction that there is a pressing need to encourage communication and joint efforts among the various disciplines concerned with economic and social developments and educational planning. Through the process of building bridges between the separate disciplines, we can more effectively help to build the future.

THE MATRIX OF CHANGE -- THE ANALYTIC CONTEXT

Systems Analysis and Social Systems Analysis

There are many groups and individuals with different viewpoints and capabilities involved in research which has policy implications for the educational systems of the future. Some are primarily concerned with the applications of modern technology, especially the computer based technology, to teaching and learning. Others are concerned with anticipating the role of underlying changes in society and in technology, e.g., urbanization or automation, as strategic variables making for change in education. The time horizons of many groups encompass the present and the near future, while others seek to understand and to encourage changes in the present and the near future by looking ahead to the year 2,000 and beyond. Some researchers are concerned with the overall design of new educational systems in what is expected to be the radically changed socio-economic framework of the next generation. Other researchers direct their effort toward providing the information needed to make decisions for more effectively meeting problems as they are likely to emerge in the next decade or two in a society evolving out of the present. The philosophical direction of some studies stresses behaviorism - function, technique, and performance. The underlying orientation in other studies emphasizes humanism - thinking, being, values, and the quality of life.

NPA's focus in its approach to educational policy research constitutes a type of systems analysis. The systems concept can be used in two different senses. One regards the design of educational systems as a problem in engineering. Planning an educational system, from this point of view, is much like designing a bridge or a space vehicle to land on the moon. In this content, the problem becomes one of technique, of utilizing within education the techniques of comprehensive planning derived from operations research which have proven effective in the defense establishment, in the space program, and in industry.

The systems concept can also be used in another sense, in the sense of the interactions of a series of institutions - the labor market, the school system, the city - in which changes in one institution bring into being changes in the others. While the responses to change in these institutions can be expected to involve many questions of technique and of social engineering, they also involve considerations of the nation's aspirations and priorities, the choice of whose options are to be implemented, the receptiveness to change of the personnel and bureaucracies in each institutional area, and the role of the political process in arriving at accomodations to change.

Changing career opportunities offers a useful point of departure for many types of social systems analysis. Rapid growth in opportunities in white collar occupations, for example, constitutes a major factor in the expansion of enrollment and facilities in higher education since World War II. The cleavage between suburbs and central cities, cleavages along lines of race and income, have become a significant force in inducing change in urban school systems. The educational consequences of this division are so far-reaching that, according to one recent study, The Urban R's, "The most urgent urban educational challenge .. is not curriculum or instruction. It is the challenge of changing race relations." (1) The association between educational attainment and occupational status lies at the root of much of the urban challenge to education. As educational requirements increase throughout the occupational structure, the economic penalties for lack of an adequate education assume greater significance. Currently, they have come to be regarded as a strategic cause in limiting the social mobility of the poor, white and nonwhite.

Changes in manpower requirements affect education, in part, because of their implications for careers and social status. Developments in the labor market are also important for education because the forces which are inducing these changes, technological and economic advance, are also substantially increasing the leisure available to most Americans. Education in the next two decades, accordingly, will face both the problem of the relevant education for work, and the more difficult problem of designing a suitable education to prepare persons for the greater part of the time when they will be engaged in activities other than work.

The Matrix of Change

The relationship between the institutions concerned with work, education, and employment can be explained in terms of "the matrix of change". In this matrix social and economic changes provide the "challenge", and changes in the educational system provide one of our society's avenues of "response". To keep the discussion within meaningful bounds, the educational responses considered refer primarily to the education which is associated with occupational preparation in the elementary and secondary schools as these responses are affected by the economic consequences of technological change, by our society's greater concern with poverty and equal rights, and by the changes arising out of the growth in leisure and income levels. Within the scope of this brief pilot study, it is apparent that the changes considered make up only a small part of the new developments in education which are likely, or possible, in the next ten or twenty years. (See Table 1 on pp. I-3, I-4.)

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(1) Dentler, Robert, et. al., The Urban R's: Race Relations as the Problem in Urban Education, Frederick A. Praeger, 1967, p. x.

Table 1.

THE MATRIX OF CHANGE

A. The Socio-Economic "Challenge"

Socio-Economic Changes	Impact on Society's Aspirations and Expenditures	Manpower Implications of Changes
technological change	in education	rapid growth in professional, technical, and service occupations
increasing leisure	in health	slow growth in jobs requiring limited skill and education
concentration of poverty and "left-out" groups in inner city	in housing	problems of manpower supply in highly skilled occupations
	in manpower retraining	differential impacts of nation's priority choices for manpower needs
	in research and development	employment opportunities for special groups - nonwhites, women, teenagers
	in social welfare	
	in urban development	
	etc.	

Table 1., continued...

THE MATRIX OF CHANGE

B. The Educational "Response"

What is to be taught?	How is it to be taught?	Who is to teach it?	In what kinds of educational organizations?
preparation for range of job skills rather than specific job	more individualized learning through use of programmed instruction	large-scale use of non-professional personnel as aides	shift in training in specific occupations to post-secondary institutions and to industry
basic education as prerequisite for employment, and training for "left-out" groups	greater emphasis on films, tapes, and educational TV	training of new type of teacher able to teach in terms relevant to inner city subcultures	schools as community centers serving adults as well as children
attitudes and behavior relevant to culture of work	teacher as tutor and counselor rather than dispenser of information to group	widespread use of writers, artists, social activists on school staff	organization of high school education in large cities in educational parks
teaching of occupational information in elementary schools	use of innovations in training from Job Corps, MDTA, industry, armed forces	National Teacher Corps	decentralization of school systems in large cities
	introduction of ungraded elementary schools in inner city		
	introduction of vocational content as part of general education		
	emphasis on measurement of performance in behavioral terms		

In the matrix of change analysis, socio-economic changes become translated into challenges which affect education through their impact on the nation's aspirations, and the manner in which we allocate resources, human and otherwise, to achieve priorities. Changes in the priorities assigned to programs for rebuilding cities, to cite an instance, would have far-reaching consequences for high school and junior college vocational education because of the rapid growth in employment opportunities for building trades workers, draftsmen, and for persons in the service industries concerned with construction. Greater emphasis on objectives in enlarging access to medical care for Americans would be a major force in devising new programs in education and training to prepare the large numbers of medical technicians, nurses' aides, and psychiatric aides who would be required as both the population and the availability of medical services to the population grew. The new careers open in these occupations could be expected to create many opportunities for improving the economic and social status of young persons in the left-out groups in American society.

Education figures both as part of the socio-economic challenge, and also as one of the systems which responds to these challenges. The growth in our society's aspirations in education reflects its importance as a means for the enrichment of personal life in a mass society and for the achievement of national purposes, as well as reflecting the role of education in preparing people to become participants in gainful employment. A rising level of educational attainment, coupled with greater leisure and higher personal incomes, can offer a popular basis for a revival of the arts, for greatly increased international travel, and for more, and more effective, participation in community organizations. The impact of coexistence with the communist nations accentuates the need for more general education to promote our own cultural performance, and for more technical education to add to the skills required to increase our economic strength. In addition, the changes in social values among young persons which has led to what is so frequently referred to as "the generation gap" is intimately associated with greater exposure to higher education.

Time as a Variable in Policy Research

In seeking a focus for NPA's research, the pilot study has also underscored the importance of the choice of time horizons in defining what are considered as the relevant problems for consideration, the strategic forces making for change, and the options for change in education. It is also apparent that different time perspectives are suited to dealing with different problems.

A time perspective of a generation or longer is probably required for indicating the full effects of major technological changes, and of underlying shifts in cultural values and social organization. It is reasonable to anticipate that it will be another generation or more before the current developments in oceanics or water desalination have sufficiently been diffused in everyday use to ease the food shortages which so severely limit growth in output and in living standards in the developing nations of the Near East or in India. A time period of a comparable period would be necessary to assess the consequences of the changes in values symbolized by the "hippies" for the emphasis on individual achievement and consumption as primary values in American society.

A shorter time span - a period of approximately ten years - is more suited in focussing on problems requiring tentative solutions which can evolve and be workable in a society in which institutions are changing, with major changes in some areas but evolutionary changes in most others. This kind of planning must take into account constraints in the shorter period which are likely to be regarded as variables if the next 30, 40, or 50 years are selected as the time span for research.

Education in the urban ghettos offers an illustration of the relevance of the differences in time horizon for educational policy research. Researchers concerned with designing an educational system for the year 2,000 might well conclude that sufficient time had elapsed for the cumulative effects of changes in social attitudes, in legislation, and the impact of the black power and civil rights movements to have largely eliminated the persistence in the larger society of discrimination in employment and in choice of residence. The Negro family, by that time, is likely to evolve into a much closer approximation to the partriarchal family characteristic of the rest of the United States. Over the course of the next three decades, rising productivity may increase our resources to a degree sufficient to provide a minimum income equivalent to what is currently regarded as a middle-class income as a matter of right to all American families. In another generation, the greater political power of the central city low-income population, white and nonwhite, is likely to have made itself evident in decision-making in the urban schools, perhaps by facilitating decentralization of the present systems on a massive scale.

Designing an educational system on the premise that these changes were to occur would abstract from many of the difficult problems which confront decision-makers concerned with choosing among strategies for improving education in the central cities in the next five or ten years. These strategies, if they are to constitute progressive changes, must be capable of implementation in an environment in which discrimination in employment and housing are potent forces, and in which the urban poor are underrepresented in educational decision-making. The compensatory education programs, the educational parks and similar measures intended to overcome the pervasive effects of poverty and discrimination would be of little significance in educational planning if poverty and discrimination could be assumed to have largely disappeared.

NPA's research is primarily directed at supplying the information which can provide a basis for planning - for devising policies to cope with problems as they are likely to emerge or to become accentuated in the next five or ten years. The research, accordingly, concentrates on the analysis of social and economic developments during a time span of a decade or somewhat longer, developments usually summarized in the form of quantitative projections. Projections of this type are especially suited to deal with changes in career opportunities and manpower needs. It is possible to prepare projections of employment by occupation because a majority of the persons who will be in the labor force by 1980 are already in it, or they can be expected to join the labor force in the next few years. While most persons will probably change jobs a number of times and move from one occupation to another, they are far less likely to shift from one occupational skill level to another during their adult life. Technological, economic, and social changes will make numbers of existing occupations obsolete and introduce new ones. However, many of the changes are likely to grow out of developments which are already apparent. The elements of continuity in the labor market system constitute a reasonable basis for anticipating the magnitudes of overall changes in the occupational structure. Major discontinuous changes, e.g., a nuclear war or a large-scale depression, would outmode the projections to the degree that they made for far-reaching and unanticipated changes in the operations of the institutions which the projections reflect.

Humanistic and Behavioristic Orientations in Policy Planning

An analysis of the implications of changing manpower needs for education implies a functional type of analysis. The projected employment opportunities are the requirements for producing a particular level and composition of gross national product, or the requirements for achieving objectives in areas such as health or urban development. The quantitative analysis depicts the individuals who enter into the statistical aggregates in terms of only one of their attributes, their occupational classification. Yet these individuals are persons who seek purpose and meaning in their lives, a purpose and meaning which need not be reflected in their occupation. From this perspective, economic projections reflect a behavioristic orientation. They are concerned with function and performance rather than with thinking, being, feeling, and interacting.

Both the behavioristic and the humanistic orientations have important implications for educational policy research. The link between the system and the persons in the system in the behavioristic approach can be summed up in terms of the concept of adjustment. Without a satisfactory occupational adjustment, individuals remain unfulfilled in one major area of their existence, a lack of fulfillment which is likely to lead to frustration in many areas other than the work situation. Carried to its logical extreme, the end result of behaviorism is to accustom people to achieve, rather than to think for themselves or to be different. The Nazi educational system in the 1930's offers a strong case. Young Germans, at that time, were systematically taught to function within their social system with a high degree of efficiency without thinking about the social system in which they were achieving or their role as persons within the system.

Humanism carries with it an emphasis on the individuals who make up the manpower aggregates as persons rather than as personnel. It points up the possibility that the persons who are employed in satisfying the economy's manpower requirements may be alienated from their work which they may regard as undermining human dignity and self-realization. In its extreme versions, humanism implies a tendency to disregard the necessities of having and doing within the requirements of an organized society. Its equivalent in social theory are the Utopias where problems and constraints vanish or are assumed away. Implicit in this thinking is the 18th century concept of the perfectibility of man. Man, by nature good, is corrupted by evil institutions. If social institutions such as the educational system were designed which encouraged man's innate goodness to express itself, evils such as poverty, ignorance, war, or discrimination would disappear. Currently, many of the variants of this type of thinking are predicated on the assumption that, for the first time in history, massive technological changes make Utopia possible. The tremendous leaps in productivity expected because of these changes, it is believed, will make it possible for most persons to live with little or no work, for competitive striving and inequality of rewards to wither away, and to design institutions with little regard for the constraints imposed by limitations of resources. Considerations of manpower requirements or of the place of education as occupational preparation would have mainly historical significance if this technologically-based version of future social-economic development were to materialize.

Without reconciling the differences in educational planning induced by an emphasis on education for work as distinguished from education for living, it is significant to observe that the technological and economic changes which are already upon us are narrowing the differences between the two. Changing manpower requirements pose a problem for all contemporary societies which utilize, or wish to utilize, modern technology. The education which takes into account the new labor market needs in the next two decades will increasingly be the general education concerned with human relations and developing meaningful communications between persons.

CHANGING CAREER OPPORTUNITIES AND THE CHALLENGE TO EDUCATION

Some Recent History

Education in the United States is intimately associated with the egalitarian values of American society. Widespread diffusion of educational opportunity has been our main channel for diffusing social and economic opportunity. For this reason, expanding educational opportunities, both within and outside of the organized school systems, has become a strategic ingredient in the nation's programs for coping with poverty, teen-age unemployment, and racial discrimination. Viewed from the vantage point of the labor market, the educational system diffuses social and economic opportunity by educating and training persons to become participants, or more productive participants, in gainful employment. While this objective of education is readily apparent in the education which is labelled "vocational", it is also true for the education which is regarded as "general" or "liberal".

Much of educational planning is concerned with careers, livelihood, and manpower needs. This concern is evident in the popular and the more technical discussions of automation, of school dropouts, or of the "manpower revolution". The significance of education for livelihood was a major consideration in the enactment of legislation such as the Vocational Education Act of 1963, the Elementary and Secondary Education Act, the Higher Education Act, or the establishment of the Job Corps. The relationship between manpower considerations and education also figures in the Health Professions Assistance Act or the Manpower Development and Training Act. This legislation is directed at growing manpower shortages in some areas, as in the health occupations, and it also reflects a response to the economic, social, and technological changes which have been accentuating the penalties for lack of sufficient education or vocational training.

Considering the entire period since World War II as a unit, the broad shifts in the occupational distribution of employment have expanded opportunities for the well-trained and educated, and they have expanded them less, or curtailed them, for persons with limited schooling (see Table 2-1). The fastest growing occupations have typically been those requiring a good education, not only high school but also college as well. Employment for professional and technical workers, for example, grew by over five times the percentage increase in overall civilian employment during the post-war period. The occupations which provide the bulk of the job opportunities for persons with less than a high-school education, especially blue-collar jobs and farming, have been increasing slowly or decreasing. The major exception is in the service occupations, other than in private household work. These changes are summarized in Table 2-1 on page II - 2.

Table 2-1

EMPLOYMENT BY OCCUPATIONAL GROUP, 1947 AND 1964

	Number Employed (in 000)		Percent Increase, 1947 to 1964
	1947	1964	
Total Civilian Employment	57,850	70,350	22%
White Collar Workers	20,200	31,150	54
Professional & Technical Workers	3,800	8,550	125
Managers, Officials & Proprietors (a)	5,800	7,450	29
Clerical Workers	7,200	10,700	48
Sales Workers	3,400	4,450	31
Blue Collar Workers	23,550	25,550	8
Craftsmen & Foremen	7,750	9,000	16
Operatives	12,300	12,900	5
Laborers (b)	3,500	3,600	3
Service Workers	5,950	9,200	55
Private Household Workers	1,700	2,300	34
Other Service Workers	4,250	6,900	63
Farm Occupations	8,100	4,450	-45

(a) Excluding farm.

(b) Excluding farm and mine.

Source: Manpower Report of the President, 1966, Table A-10, p. 164.

While technological change, and especially the technological changes associated with automation and cybernation have received widespread consideration as the main cause of the changes in the occupational distribution over the past two decades, it is often difficult to separate the effects of technological change from those of other factors which influence career opportunities. As average family incomes have risen from $5,600 in 1947 to $7,800 by 1964 (in dollars of 1964 purchasing power), American families have spent relatively more of their incomes for vacations and travel, for automobile purchase and operation, for books and education, for health care, and for the services of beauticians, household appliance repairmen, and gardeners. Pursuit of national priorities in improving the quality of life for a growing and an increasingly urbanized population has been superimposed on the effects of rising incomes, greater leisure, and technological advance in creating new employment opportunities. To cite education as an illustration of the impact of programs in pursuit of national priorities, between 1947 and 1964 state and local government employment in education, largely made up of workers in professional, technical, and service occupations, increased by over 140 percent.(1) This was six times the rate at which total civilian employment grew.

The Technology-Productivity Debate

Looking toward the future, consideration of the significance of changes in employment opportunities for planning in education has tended to center on the role of technological change. The burden of adjustment to technological change in the past two decades has fallen with special force on persons with limited schooling by reducing the job opportunities available to them. At the other extreme, technological progress, and the social effects of this progress, have been a major element in the rapid expansion in opportunities in the professional and technical occupations. Many observers have been sufficiently impressed with these consequences of technological advance to predict that an anticipated acceleration of this advance in the coming decades will divide the labor force into two groups. One will be made up of individuals with limited schooling and occupational skills. The long-term prospects for these persons are expected to be characterized by unemployment and underemployment as their occupational specialties become superfluous in an automated economy. The other group would consist of highly educated professional, technical, and managerial workers. It is anticipated that our ability to educate and train workers in these occupations will typically lag behind the growth in demand for their services. If this version of the future were to come into being, far-reaching changes would occur in our social structure, in economic policy, and in educational planning. To utilize the anticipated revolutionary growth in productive potential, it has been proposed that the government pay a guaranteed annual income to keep those persons who are no longer required as producers active in the economy as consumers. (2) For most persons, education would be directed at cultivating the creative uses of leisure, encouraging participation in community activities, and preparing young people for a future in which work was only a minor aspect of life. Occupational preparation would be concentrated on educating and training persons for the professional, technical, and managerial occupations, fields in which there was an apparently insatiable demand.

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(1) Statistical Abstract, 1965, p. 442.

The long-term impact of technological change for the economy's output makes itself evident in the rate of productivity growth. Changes in productivity are conventionally measured in terms of the gross national product produced per man-hour. For the overall economy, GNP per man-hour has been increasing at a rate of approximately 3 percent a year for the past two decades. It is projected to increase, according to NPA's National Economic Projection Series by somewhat more than 3 percent, by 3.3 percent a year, in the next ten or fifteen years. (3)

Productivity growth of slightly more than 3 percent annually diverges from the discontinuous increases in productivity implied by the forecasts of widespread redundancy of manpower resulting from the adoption of the computer-oriented technologies. The slower rate of productivity increase is in accord with the conclusion of the National Commission on Technology, Automation, and Economic Progress that "a sharp break in the continuity of technical progress has not occurred, nor is it likely to occur in the next decade". (4)

One of the considerations entering into NPA's productivity estimate is that many of the rapidly growing sectors of the economy, e.g., the service industries, are characterized by slow growth in productivity insofar as productivity can be measured in these industries. According to the U.S. Department of Labor, about four-fifths of the growth in employment outside of agriculture between 1965 and 1975 will take place in the service industries. (5) In the mid-1960's, the service industries already accounted for over half, 57 percent, of non-agricultural employment. At the other end of the productivity spectrum, agriculture has been characterized by high rates of productivity growth which have served to raise the economy-wide average. However, agricultural output, while increasing, has been decreasing as a share of total economic activity in the United States and this proportional decline is expected to continue for the forseeable future. In many areas technological change increases total employment by providing new or improved services or by reducing the costs of producing existing types of goods and services. For example, the more reliable weather forecasts made possible because of the use of space satellites and computerized weather information systems has led to a sizeable increase in employment associated with weather forecasting rather than to a decrease. In addition, initial high capital and operating costs, the existence of large investments in the older technology, lack of supporting facilities, and institutional resistances often pose formidable obstacles to the rapid diffusion of new technology. Experience with automated teaching equipment in the past decade offers an instance.

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(2) For a presentation of this viewpoint, see the statement of the Ad Hoc Committee on the Triple Revolution, 1964.

(3) National Planning Association, Center for Economic Projections, National Economic Projection Series, 1963, p. I-9.

(4) National Commission on Technology, Automation, and Economic Progress, Technology and the American Economy, 1966, p. 1.

(5) Manpower Report of the President, 1968, p. 304.

If this report were concerned with educational policy for the year 2,000 and beyond rather than with the next two decades, it might be reasonable to expect that the social and economic impacts of automation and related changes would assume major proportions, perhaps similar in scope to the impact of nuclear weapons for military technology in the past generation. For the shorter time span which is relevant for most educational planning, allowing for a considerable range of uncertainty as to the precise productivity changes, the economy-wide growth in productivity arising from the computer-oriented technologies is more likely to accelerate tendencies which are already present in the economy than to diverge markedly from them.

The Implications of Alternative Productivity Assumptions

To provide an indication of the implications of more or less rapid rates of technological change which are consistent with historical experience for career opportunities, total employment, and for leisure, two alternative projections are presented for the mid-1980's. One assumes an overall increase in GNP per man-hour similar to the average annual increase during the 1948 to 1965 period, approximately 3 percent. The other projects an annual rate of growth equivalent to the maximum increase the economy has sustained for several years at a time in the past generation, a growth of 3.6 percent. These projections serve to illustrate differentials in social and economic impact resulting from more or less rapid technological advance and they do not represent "high" and "low" estimates of the probable changes in productivity in the future.

Since each of these alternatives presupposes its own configuration of economic magnitudes, the overall demographic and economic framework for the two projections is summarized in Table 2-2. 1964 serves as the base year. (See page II - 6.)

Table 2-2

ESTIMATED POPULATION, EMPLOYMENT, AND GNP, 1964 AND PROJECTED 1985

Item	Actual 1964	Projected 1985 3% Annual Productivity Growth	 3.6% Annual Productivity Growth
Population (in millions) (1)	192.1	264.6	264.6
Civilian Labor Force (in millions) (2)	74.2	105.3	103.9
Civilian Employment (in millions)	70.4	101.1	99.8
Average Weekly Hours of Work	38.5	35.4	33.9
GNP (in billions of 1964 dollars) (3)	632	1,547	1,641
GNP per Manhour (in 1964 dollars)	4.32	8.09	9.08
Income per Person (in 1964 dollars)	2,580	4,840	5,150

(1) Projected population estimates are consistent with the U.S. Census Bureau's Series B projection of the population to 1975 and 1985.

(2) Based on the total labor force definition of persons 14 years and over.

(3) The GNP corresponding to the 3 per cent productivity growth estimate implies an annual increase in GNP averaging 4.3 per cent between 1964 and 1985, and the alternative estimate implies an average annual GNP growth rate of 4.7 per cent.

Increases in GNP of the magnitudes considered, to $1.5 or $1.6 trillion (in 1964 dollars), would greatly expand the areas of choice open to Americans in rebuilding cities, in social welfare, in health, and in other areas. There would be far more freedom for persons to travel, to have access to our society's cultural and recreational facilities, or to choose between work and leisure. Continued growth in the economy would provide the means for far greater expenditures in education, largely for experimentation with a variety of new educational programs, better school facilities, and higher teachers' salaries.

Growth in economic resources of these dimensions may appear to suggest that the need for priorities - for choices - will disappear, and that all of the nation's objectives will become attainable in a decade or two. However, the population is expected to increase by 73 million between 1964 and 1985. There would be an anticipated 30 or 31 million more persons in the civilian labor force. Part of the increases in output would be required simply to maintain the equivalent of present standards of living, education, health, housing, or social welfare for a much larger population. Another part would need to be set aside to provide the additional plant and equipment to employ a greatly expanded labor force engaged in producing a far larger volume of output. In an earlier study of the dollar costs of achieving national goals in the mid-1970's, it was estimated that half of the potential increase in GNP between 1962 and 1975 would be absorbed in maintaining present standards for a larger population, and in supplying the additional industrial facilities required to produce the larger GNP projected for 1975. (6)

Both projections anticipate a future in which most workers would be enjoying considerably more leisure than in the mid-1960's, the equivalent of an additional month or month and a half more leisure a year by 1985 than in 1964. The additional leisure would partially be taken in the form of a shorter workweek and, probably even more so, in longer vacations. The sabbatical leaves now largely confined to teachers and to steel workers would come to include many more persons in the workforce. As income per person increases from about $2,600 to approximately $5,000, the choices in economic policy would become increasingly concerned with the degree to which this greater affluence should lead to rising standards of private consumption, or the degree to which the growth in personal income should be diverted through a progressive tax system to provide greatly increased resources to pursue objectives in education, health, social welfare, international aid, urban development, and similar fields. Growing affluence and greater leisure would pose a host of difficult challenges to education. This would include education for young persons and adults in the creative uses of leisure, education for self-fulfilling activities in retirement, and to achieve a balance between "job oriented" and "liberal" education.

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(6) Lecht, Leonard A., Goals, Priorities and Dollars - The Next Decade, The Free Press, 1966, pp. 40 ff.

With the more rapid productivity growth, more persons would decide not to participate in the labor force. Greater affluence, along with the shifts in the occupational composition of employment induced by rapid technological change would encourage many young persons to choose to remain in school rather than to find a job. A sizeable proportion of the adult workers withdrawing from the labor force would probably be unskilled workers, or persons with obsolete job skills who elected to retire at an early age because of generous retirement pensions coupled with the difficulties in obtaining satisfactory employment. A sizeable number of these adults would return to school to obtain the education which was unavailable to them early in life.

The anticipated distribution of employment in 1985 corresponding to the alternative productivity assumptions is described, by broad occupational group in Table 2-3. (See page II - 9.)

Overall employment in the estimate with the higher rate of productivity growth is virtually identical - about 1 percent less - than in the projection assuming a slower pace of technological advance. In both projections the broad changes in the occupational distribution are similar, but the shifts are accentuated with more rapid productivity growth. In both, the largest percentage increases are listed for professional and technical workers. In 1964, 1 out of 8 employed persons was at work in a professional or technical occupation. By 1985 this ratio is expected to increase to 1 out of 6. Large increases are also projected in the service occupations other than for private household workers. Employment for blue collar workers is expected to grow, but to increase at only half the rate as total civilian employment. Job opportunities in the farm occupations are projected to decline to slightly more than half the 1964 level.

More rapid technological change would accelerate the increase in employment opportunities for professional and technical workers, and especially for scientists and engineers. Greater-than-anticipated automation and mechanization would primarily reduce the growth in employment for operatives and laborers and for the less skilled clerical and sales workers. The higher incomes and greater leisure associated with the more rapid productivity growth would lead to greater demands for service workers of many kinds and for professional workers such as physicians and teachers.

Both projections make it apparent that the occupational areas which are likely to grow more rapidly are those in which preparation for employment involves an educational requirement - high school graduation and, to a larger extent, higher education. Replacement needs rather than employment growth will figure as the major source of career opportunities in many of the skilled blue collar occupations which have been important in high school vocational education or in apprenticeship training, e.g., printing craftsmen, carpenters, or painters. Far more than at present,

Table 2-3

ESTIMATED DISTRIBUTION OF EMPLOYMENT, BY OCCUPATIONAL GROUP, 1964 AND PROJECTED 1985
(in millions)

Occupations	1964	Projected 1985		Percent Change, 1964-1985	
		3.0% Productivity Growth	3.6% Productivity Growth	3.0% Productivity Growth	3.6% Productivity Growth
White Collar Workers	31.1	50.9	50.5	64%	62%
Professional and Technical	8.6	15.9	16.9	85	97
Managers, Officials and Proprietors	7.5	10.9	10.6	45	41
Clericals and Sales	15.1	24.1	23.0	60	52
Blue Collar Workers	25.5	32.1	30.9	26	21
Craftsmen and Foremen	9.0	11.8	11.5	31	28
Operatives and Laborers	16.5	20.3	19.4	23	18
Service Workers	9.3	15.7	16.0	69	72
Private Household Workers	2.3	3.1	3.1	35	35
Other Service Workers	6.9	12.6	12.9	83	87
Farm Occupations	4.4	2.5	2.4	-43	-46
Total Civilian Employment	70.4	101.1	99.8	44	42

vocational education in the schools will become directed at preparing young people for service occupations. Many of these positions will represent openings in newly emerging human service occupations, in jobs as teachers' aides, nurses' aides, counselors for the aged, and as neighborhood workers in programs concerned with poverty or the inner city educational system. This takes it for granted that rapid growth in needs for persons in the subprofessional human service occupations, and greater expenditures to translate needs into programs, will create the conditions for making these jobs more attractive in terms of earnings and career opportunities.

Career Opportunities and the Pursuit of National Goals

The manpower projections in the previous section represent estimates of the anticipated job openings in 1985 under alternative assumptions about productivity growth. This section is also concerned with future manpower requirements, but it views them from a different perspective, namely, in terms of the employment needs for the achievement of an illustrative set of national goals by 1975 aimed at improving standards of performance in American life. This research is largely an outgrowth of earlier studies of requirements for achieving national goals undertaken by the National Planning Association's Center for Priority Analysis. (7)

Our society's choice of priorities will significantly influence national programs, employment opportunities, educational requirements, and occupational preparation in the 1970's and 1980's. The role of the space program in increasing requirements for engineers, scientists, and technicians in the early 1960's, or of Medicare and Medicaid in enlarging needs for physicians, nurses, medical technicians, and hospital attendants offer recent, and sometimes striking illustrations.

The goals considered in NPA's goals analysis cover virtually all aspects of the private and public sectors of our society. Accordingly, they make it possible to present a comprehensive portrayal of the relationship between pursuit of national objectives, as illustrated by these goals, and the economy's needs for manpower. Since the original study of the dollar costs of achieving national goals refers to the year 1975, the manpower projections are related to the same year. The directions and broad magnitudes of change projected for the next decade can provide insights into the career opportunities and occupational preparation likely to characterize the decade which follows.

The sixteen areas in NPA's earlier studies for which goals have been defined and "priced out" are as follows:

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(7) See Lecht, Leonard A., Manpower Requirements for National Objectives in the 1970's, Manpower Administration, U.S. Department of Labor, 1968.

1. Agriculture
2. Area Redevelopment
3. Consumer Expenditures
4. Education
5. Health
6. Housing
7. International Aid
8. Manpower Retraining
9. National Defense
10. Natural Resources
11. Private Plant and Equipment
12. Research and Development
13. Social Welfare
14. Space
15. Transportation
16. Urban Development

Needs in each of these areas, and standards for achieving goals have been formulated by the National Planning Association from studies by bodies such as the National Academy of Sciences, and from legislation, legislative hearing, and general national policy. The standards selected reflect developments in the early and mid-1960's, and they represent levels of achievement regarded as reasonable and individually within reach in the light of present knowledge and in a free enterprise system.

Table 2-4 illustrates the differences in impact of the nation's choice of priorities for employment and career opportunities in the 1970's. These are indicated for three goals, for health and education considered as a single goal, for the research and development goal, and for the urban development goal. The estimates include both the direct employment in the industries producing the goods and services each goal requires for its pursuit, and the indirect employment in the industries supplying inputs of raw materials, equipment, and services to the firms producing the end products required to achieve the different goals. (See page II - 12.)

Assigning a high priority to health and education goals would create job openings for large numbers of physicians, dentists, nurses, librarians, teachers at all levels, and medical technicians. These professional and technical occupations would constitute the bottleneck occupations in achieving objectives in health and education. The substitution of auxiliary personnel to perform many of the tasks formerly done by physicians, dentists, nurses, and teachers is responsible for much of the expected growth in opportunities for service workers. Relatively few jobs are created for blue collar workers by activities related to health and education.

Pursuit of the research and development goal, like the health and education goal, would create many opportunities for professional and technical workers, in this case primarily for engineers, scientists, and technicians. Expenditures for research and development programs also generate employment for substantial numbers of workers with other, and often lesser occupational skills. Managers, secretaries, or mechanics and repairmen are instances. Manufacturing the elaborate equipment used in much research and development, such as space vehicles or linear accelerators, creates employment for many blue collar workers, primarily for factory operatives.

Table 2-4

ESTIMATED DISTRIBUTION OF EMPLOYMENT REQUIREMENTS FOR SELECTED GOALS, BY MAJOR OCCUPATIONAL GROUP, IN 1975

Occupational Group	Estimated Distribution of Employment in 1975		
	Health and Education*	Research and Development	Urban Development
White Collar Workers	62.0%	56.5%	37.0%
Professional and Technical Workers	44.0	36.5	9.0
Managers, Officials and Proprietors	2.5	6.0	11.0
Clerical and Sales Workers	15.5	14.0	17.0
Blue Collar Workers	15.0	38.5	57.5
Craftsmen and Foremen	6.5	13.0	29.5
Operatives and Laborers	8.5	25.5	28.0
Service Workers	22.0	4.5	4.0
Farm Occupations	0.5	0.5	1.0
Total	100.0%	100.0%	100.0%
Total Number Employed (in thousands)	17,140	4,295	10,160

*Because of the basic data problem, the occupational requirements for the health and education goals were treated as if the two were one goal.

Few service workers or farmers would be employed because of research and development programs.

Scientists and engineers make up the bottleneck occupations for the research and development goal. Requirements for scientists and engineers to attain this goal are projected to double in the course of the next decade. Large increases in the supply of technicians, workers frequently trained in junior colleges, could reduce these prospective bottlenecks by making it possible to utilize technicians in much of the routine work currently performed by scientists and engineers. Grant Venn has suggested that the educational system must triple its current effort to meet a minimum target of 100,000 new science and engineering technicians a year.(8)

An emphasis on urban development priorities, on the other hand, would lead to large increases in career opportunities for blue collar workers, especially in the building trades. The "shortage" occupations for the urban development goal would be concentrated in the skilled building trades, fields for which apprenticeship programs, high school vocational education, and on-the-job training are the typical avenues of access. Pursuit of this goal would entail only a modest growth in job openings for service workers and for professional and technical employees. However, employment for architects, draftsmen, and civil engineers would be significantly affected by large-scale programs for rebuilding the cities.

The three goals selected as illustrations show that the nation's choice of priorities can make for important differences in the kinds of job opportunities which are available, and in the kinds of education and training needed to prepare young persons for future employment. In recent years the country's civilian economy program choices have primarily affected manpower needs in the professional, technical, and service occupations associated with education and health, with research and development, and, to a lesser extent, with social welfare. Should the nation accord a comparable priority to reducing the backlogs of urban facilities of many kinds, a proposal receiving consideration in many quarters, there would be a corresponding growth in opportunities for blue collar workers.

The Pursuit Of National Goals and Career Opportunities for Nonwhites

The potentials for increasing employment and upgrading job opportunities for individuals in the groups which include the bulk of the economy's underutilized human resources make up one of the strategic considerations in determining the pace at which the nation can pursue its objectives without encountering manpower bottlenecks. Our choices of priorities in the next decade will have an important influence in increasing opportunities for persons in these groups. These potentials are indicated by the projections for nonwhites.

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(8) Venn, Grant, Man, Education and Work, American Council on Education, 1964, p. 134.

Career opportunities for nonwhites in the next ten years will reflect the overall rate of economic growth, and the extent to which the nation implements its commitment to civil rights, as well as the influence of the particular goals receiving a high priority in the 1970's. The anticipated net result of these three sets of forces are summarized in Table 2-5. The table indicates the estimated employment for nonwhites per billion dollars of expenditures for the activities associated with the pursuit of specific goals in 1962 and 1975. (See page II-15.)

The estimates are based on the changes in the proportion of nonwhites employed in each occupation between 1950 and 1964. They also reflect judgments concerning the degree to which civil rights legislation, labor shortages, and changes in hiring and upgrading practices will affect the 1950 to 1964 rates of change in the next decade. Both the historical data and the projections show that a billion dollars spent for health and education, or social welfare objectives create more employment for nonwhites than a comparable volume of expenditures for any other goal. While many of these job openings would represent employment for elementary and secondary teachers, nurses, medical technicians, or social workers - occupations in which nonwhites are already well represented - the bulk of the employment would be in less skilled service jobs such as janitors and porters, or institutional attendants. While somewhat fewer nonwhites would be employed per billion dollars spent for housing or urban development objectives, programs for rebuilding cities or eliminating slums would create many opportunities for Negroes or other nonwhites in skilled crafts. The level of effort regarded as necessary to attain the urban development goal, for example, is projected to create employment for over a quarter of a million nonwhite craftsmen by 1975.

While many considerations will influence the nation's choice of priorities in the 1970's, the implications of the different choices for improving employment opportunities for the disadvantaged, white and nonwhite, are likely to loom larger in the decision-making process in the next decade than in past decades. Expanding employment opportunities in this way for Negroes, Puerto Ricans, Mexican-Americans, American Indians and others will involve a concerted effort in many institutional areas - schools, government, employers, and labor unions - to enlarge opportunities for education and training and to eliminate discriminatory practices in the labor market. By utilizing more of the available workforce, and utilizing them more effectively, these measures also enhance our capacity for achieving goals.

Table 2-5

ESTIMATING POTENTIAL OF INDIVIDUAL GOALS FOR GENERATING EMPLOYMENT FOR NONWHITES

Goal Area	Nonwhite Employment per Billion Dollars of Expenditures*	
	1962	Projected 1975
	(Number Employed in 000)	
Health and Education	15.5	12.7
Social Welfare	13.3	11.2
Consumer Expenditures	13.0	10.6
Housing	11.8	10.4
Urban Development	11.2	9.6
Research and Development	9.5	8.7
Natural Resources	10.4	8.5
International Aid	11.0	8.0
Transportation	9.7	7.9
Private Plant and Equipment	9.6	7.0
National Defense	8.1	6.5

* Refers to final demand expenditures expressed in 1962 prices.

Perspectives for the 1970's and Beyond

The projections of manpower requirements for the different goals refer to national objectives as they are currently conceived. Over the next ten and twenty years, new problems and changing opportunities will create new goals and transform the standards for many existing ones. These changes will alter the economy's patterns of expenditure and the manpower and educational needs generated by these expenditures.

Present discontents in the cities and among the young point to the likelihood of a far-reaching re-examination of national goals and priorities in the coming decade, a re-examination likely to be accelerated by the release of resources no longer required for defense objectives once the war in Vietnam ends. New programs in education, in mass transit, in urban renewal, for introducing family allowances or the negative income tax, and similar measures will be appraised more heavily than at present in terms of their hoped for, or feared, consequences for the social and physical renewal of the cities. Abroad, the potentials for supplying food and raw materials on a greatly expanded scale to the developing nations by "farming" and "mining" the oceans may rank in the nation's priorities as an area of concern comparable in scope to the space program in the early and mid-1960's. The conquest of heart disease and cancer would increase the share of the population in the over-65 age group to considerably more than the tenth of the total anticipated by 1975. Along with the blessings of greater longevity, the country would face the special needs of masses of aged persons for medical care, housing, recreational facilities, and meaningful participation in American life. Each of these changes would have its particular configuration of consequences for manpower needs and the educational system.

The more limited task of making greater progress in realizing goals as they are presently conceived makes it less than probable that the vision of the future anticipated by observers who stress the role of automation in reducing employment opportunities will represent an accurate portrayal of our society 10 or 20 years from now. This representation of the future overlooks the consequences of more ambitious pursuit of national goals for the employment of blue collar and white collar workers in the coming decades.

THE CHANGING LEVEL OF EDUCATIONAL ATTAINMENT AND THE SOCIO-ECONOMIC CHALLENGE TO EDUCATION

Education as a Cause of Changes in Manpower Requirements

The level of educational attainment has been rising steadily in the United States since World War II. The needs of a growing economy, and rapid technological and social change, can be expected to further increase the educational level in the 1970's. The degree to which manpower considerations serve to increase educational attainment and training requirements in the next two decades will be significantly influenced by the nation's choice of priorities.

The relationship between the educational system and the labor market is often regarded as a simple cause-and-effect system. The schools, it is frequently pointed out, respond to changes in career opportunities. Shifts in employment opportunities, from this point of view, are the independent variable, and the educational system's response is the dependent variable. Yet it is apparent that the opposite may also be true. Increasing educational opportunities for all groups in the population is one of our society's major goals. Accordingly, the educational level has been rising for all occupational groups in the recent past. While this upgrading has been generally characteristic of the labor force, it has been especially marked for blue collar workers and farmers, the occupations which have provided the bulk of the employment for persons with less than a high-school education. Between 1952 and 1964, for example, the proportion of employed males who had completed 8 years of elementary school or less declined by 15 percentage points, from 41 to 26 percent of the total. However, the proportion of laborers with this limited education fell by 20 percentage points, from 67 to 47 percent. (1)

As the supply of well-educated, or better educated persons increases, the greater availability of these persons to employers itself becomes an important element in raising entrance requirements for many types of jobs. The college degree supplants the high school diploma regarded a generation earlier as the requirement for employment in the more responsible white collar positions. Graduation from high school becomes the prerequisite for advancement to foremens' jobs or for most types of work involving dealing with the public. As the educational requirements for employment come to be generally upgraded, the economic penalties for lack of what is regarded as sufficient education grow in importance. This reassessment of the educational qualifications for employment prompts much of the current concern with school dropouts or functional illiterates.

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(1) "Educational Attainment of Workers, March, 1964", Special Labor Force Report No. 53, U.S. Department of Labor, 1965, Table 6, p. 522.

In addition to raising entrance requirements for employment, the greater supply of well-educated and trained persons in a growing economy encourages the development of new opportunities for their use. This is especially true in areas where manpower bottlenecks have posed barriers to expanding services for which there is a substantial recognition of need. A sizeable increase in the supply of persons in the mental health professions, for example, would encourage communities to establish mental health centers in the many parts of the nation outside of the large cities in which these centers are absent. A large increase in the supply of Ph.D's in the natural sciences, to cite another instance, would lead to their employment in much larger numbers than at present in undergraduate and community colleges, and to an increase in the calibre and scope of the science programs in these institutions.

Changes in Educational Attainment in the 1970's

The increases in educational attainment which have characterized the labor force in the past two decades are likely to continue in the next two decades. As in the recent past, these changes will probably be most marked in the two groups at the extremes, for persons with 8 years of schooling or less, and for those with 4 years of college or more. Table 3-1 summarizes the projected changes in the distribution of educational attainment for the employed labor force between 1962 and 1975.(See page III-3.

The most striking change in the projections is the anticipated decrease in the proportion of persons with 8 years of schooling or less. While the proportion of employed persons who are college graduates is expected to grow by nearly 40 percent, almost three-fourths of the workforce in the mid-1970's is still likely to be made up of persons without any college education. The educational experience of most American workers in the next decade will be received through exposure to elementary and secondary education, or in adult education.

The projections in Table 3-1 are derived from recent trends in the distribution of educational attainment in each occupation, modified by judgments based on the age and sex distributions in individual occupations. Accordingly, the projections are influenced by the expected changes in the occupational structure of employment. The degree to which the changes listed are likely to be attained, exceeded, or fallen short of will reflect the occupational requirements associated with different goals. The impact of the nation's priority choices for educational requirements for employment is illustrated by Table 3-2 by the health and education, research and development, and urban development goals. (See page III - 3.)

Table 3-1

DISTRIBUTION OF EMPLOYED CIVILIAN LABOR FORCE BY LEVEL OF EDUCATIONAL ATTAINMENT, 1962 AND PROJECTED 1975

Years of Schooling Completed	Percent Distribution 1962	Percent Distribution 1975	Percent Change in Proportion, 1962 to 1975
8 Years or less	29.2%	17.4%	-40.4%
1-3 Years of high school	22.0	20.4	- 7.3
4 Years of high school	28.3	35.5	+25.4
1-3 Years of college	10.6	13.1	+23.6
4 Years of college or more	9.9	13.6	+37.4
TOTAL	100.0%	100.0%	

Table 3-2

PROJECTED EDUCATIONAL ATTAINMENT PROFILES FOR SELECTED GOALS IN 1975

Years of Schooling Completed	Health and Education Goal	Research and Development Goal	Urban Development Goal
8 Years or less	11.4%	13.5%	20.7%
1-3 Years of high school	14.6	16.5	22.3
4 Years of high school	29.0	33.7	35.8
1-3 Years of college	14.7	14.9	11.8
4 Years of college	30.2	21.4	9.4
TOTAL	100.0%	100.0%	100.0%

Pursuit of any of the goals considered would create career openings for persons with widely different levels of educational achievement in the coming decade. However, the distribution of educational requirements for the different goals varies considerably. An emphasis on health and education, for example, would create over three times as many job openings for college graduates as the equivalent emphasis on rebuilding cities.(2) Almost four-fifths of the jobs created by urban development programs represent openings for persons with less than a college education. Because of the employment generated for blue collar workers by the development aspect of research and development, more than three-fifths of the persons employed in activities related to this goal have received all of their education in elementary and secondary schools.

Although formal schooling provides the basis for occupational preparation, educational attainment is only roughly related to the specific vocational preparation involved in different occupations. Job training may be obtained within the educational system, through on-the-job training, in apprenticeship training programs, and in the armed forces or industry. The Bureau of Employment Security of the U.S. Department of Labor has undertaken studies to ascertain the length of specific vocational preparation (SVP) required in individual occupations.(3) This information provides a point of departure for estimating the distribution of skill requirements in the labor force in the 1970's, and the impact of the pursuit of particular goals for skill requirements.

The Specific Vocational Preparation concept is a measure of the length of time needed to learn the relevant techniques and to develop the facility required for the average performance in a specific job situation. Table 3-3 supplies an indication of the changes anticipated in the distribution of specific vocational preparation for the workforce between 1962 and 1975.(See p. III-5.)

The data in Table 3-3 indicate that well over half of the jobs in the economy currently require only short periods of specific vocational preparation, periods of a year or less. A considerably smaller proportion of the workforce, about three-tenths, is employed in occupations typically requiring over two years of vocational preparation. The projections point to modest changes in the length of vocational training requirements in the 1970's. This would include a small increase in the proportion of persons employed in occupations involving two to four years of training, and a comparable decrease in employment in jobs in which vocational preparation ranges between three months and a year.

Since manpower requirements vary for specific goals, their vocational preparation requirements also span a considerable range. These differentials are illustrated in Table 3-4, again with reference to the health and education goal, the research and development goal, and the urban development goal.(See p. III-5.)

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(2) This emphasis can be represented in terms of equivalent expenditures in pursuit of these goals.

(3) See U.S. Department of Labor, Bureau of Employment Security, Dictionary of Occupational Titles, Vol. II, Occupational Calssification, 3rd ed., 1965.

Table 3-3

ESTIMATED DISTRIBUTION OF EMPLOYED CIVILIAN LABOR FORCE BY LENGTH OF SPECIFIC VOCATIONAL PREPARATION, 1962 AND PROJECTED 1975

	1962		Projected 1975	
Required Training Period	Number Employed (in millions)	Percent of Total	Number Employed (in millions)	Percent of Total
Up to 3 months	14.2	20.9%	18.0	20.5%
Over 3 months and up to 1 year	27.2	40.1	32.0	36.5
Over 1 year and up to 2 years	6.4	9.4	8.8	10.1
Over 2 years and up to 4 years	14.9	22.0	22.2	25.3
Over 4 years	5.2	7.6	6.7	7.7
TOTAL	67.8	100.0%	87.7	100.0%

Table 3-4

PROJECTED DISTRIBUTION OF EMPLOYMENT BY LENGTH OF SPECIFIC VOCATIONAL PREPARATION FOR SELECTED GOALS IN 1975

Required Training Period	Health and Education Goal	Research and Development Goal	Urban Development Goal
Up to 3 months	16.3%	9.8%	14.5%
Over 3 months and up to 1 year	22.1	26.4	33.6
Over 1 year and up to 2 years	16.6	9.0	7.7
Over 2 years and up to 4 years	36.4	35.5	30.1
Over 4 years	8.6	19.3	14.1
TOTAL	100.0%	100.0%	100.0%

The greatest concentration of employment in occupations requiring lengthy job training is represented by the research and development goal. Over half of the jobs linked with this goal would require over two years of vocational preparation, preparation largely received in community colleges, 4-year educational institutions, and, for many technicians and craftsmen, in company training programs. Most of the occupations requiring two years or more of specific vocational training for the urban development goal are in the building trades. Training in these occupations is largely provided through apprenticeship programs or on-the-job training. However, almost half of the employment associated with urban development has only a brief training requirement, a year or less. The employment in health and education activities in occupations requiring over two years of vocational preparation is largely made up of professional and technical workers for whom general education received through higher education is directly linked with vocational training.

The specific vocational preparation concept is mainly important as a take off point for further research in the future changes in job training and skill requirements. The SVP is a measure of the current length of vocational preparation in each occupation, a variable subject to considerable modification as the job content of existing occupations change, and as new occupations emerge. It is sometimes difficult to interpret the meaning of the SVP categories since they do not take into account the general education which figures prominently in the occupational preparation in many, if not most, white collar occupations. Both physicians and carpenters, to cite instances, are included in the same SVP category, over 4 years. Together with the projections of educational attainment, the SVP estimates present some benchmark dimensions of the future workforce. These dimensions portray a labor force in the 1970's, and probably in the 1980's, containing many more college graduates and more highly trained persons, but also containing a considerable, although diminishing proportion of job openings for persons with limited skills and schooling.

SOCIAL CHANGES AND THE CHALLENGES TO EDUCATION

While this report is mainly concerned with labor market "challenges" and educational "responses", the nature of the challenges and the available responses are both influenced by the broader currents of change in the society in which they occur. To provide a brief synopsis of the social context in which educational planning will take place in the next two decades, the relevant variables are summarized in terms of increasing leisure, population growth, urbanization, social mobility, and the role of the self concept.

Growth in Leisure

As indicated earlier in Chapter 2, the projections for 1985 portray a future in which most persons in the workforce will enjoy considerably more leisure than in the mid-1960's, an increase estimated as the equivalent of an additional month or month and a half a year. If productivity growth were to exceed the 3.3 or 3.6 percent annual increase in GNP per man-hour assumed in the projections, it is probable that part of benefits of greater-than-anticipated technological advance would be realized by a more rapid increase in leisure than the four to six weeks included in the estimates.

The importance of greater leisure for educational planning ten or twenty years from now will be fundamental. In addition to teaching people to "do work", education will be increasingly required to prepare young persons for the long stretches of time when they will be free of work. In principle, this has always been an important objective of a liberal education. In the nineteenth century, under the influence of economic competition and religious ethics, the uses of leisure were identified with "self-improvement" and the performance of "good works". In the mass society of the mid-twentieth century, leisure has come to be identified with "fun work", with escape from the work for which one receives an income. It is almost an obligation to do something, to have fun, to act happy with one's leisure.

It was the expectation of the nineteenth century reformers, and of many other persons, that relief from the toil of a sixty hour workweek would lead to a tremendous release of pent-up demands for such forms of self-improvement as adult education, or participation in community activities. Yet it is evident from the output of much of the mass communication industries that freeing men from toil has only partially freed them for greater development of their human potentials. It is far from apparent that the human gains from reducing the workweek considerably below present levels would, by itself, necessarily result in a greater release of these potentials in the coming decade.

The discussions of the greater leisure expected to become available in the 1970's or 1980's assume that most Americans desire more leisure, and that this aspiration is the motive force making for reductions in the workweek. It is difficult, in practice, to separate out the importance of the desire for more time free from work, as a force making for shorter hours, from labor's interest in spreading work among more persons, or in reducing the point at which time and a half or double-time penalty pay for overtime begins to accrue. Faced with the choice between greater income and greater leisure, many persons would choose the income option. In 1966, for example, 3.6 million individuals in the United States held two or more jobs. (1)

Whatever the causes which are leading to greater leisure, they are likely to continue increasing the time free from work in the coming decades. Accordingly, the society of the future will be faced with the need for devising responses to three problems related to the uses of leisure. They are:

1. Why are so many persons alienated from work that leisure becomes important as an escape from work?
2. Why does leisure, in turn, take on so many of the attributes of the work which people seek to escape?
3. How can people be educated to develop the human potentials which can only partially be expressed in their occupations?

Population Growth

By 1985 the population of the United States is expected to reach 265 million, about three-eighths more than in the mid-1960's. Not only will a much larger number of persons go through the educational system, but the character and duration of their experience will also change. Twenty years ago, about half of the population of seventeen year olds graduated from high school. By 1985 close to 100 percent are likely to graduate. Currently, something over two out of five high school graduates go on to some form of higher education. By the mid-1970's this proportion is expected to exceed one-half. In another decade or two, the persons with less than a high school education in the workforce will be very largely made up of older workers.

The greater challenges posed to education because of growth in the number of persons in the school-attending age groups are underscored by the data in Table 4-1. (See page IV - 3.)

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(1) Manpower Report of the President, 1968, Table

Table 4-1

ESTIMATES OF SCHOOL-AGE POPULATION, BY AGE GROUP AND RACE, 1964 AND PROJECTED 1985

(number in millions)

Age and Race	Actual 1964	Projected 1985	Percent Increase 1964-1985
Total			
All Ages	192.1	264.6	38%
5-17 years	49.5	65.5	32
18-24 years	18.7	28.8	54
White			
All Ages	169.4	227.8	34
5-17 years	42.7	54.6	28
18-24 years	16.4	24.3	48
Nonwhite			
All Ages	22.7	36.8	62
5-17 years	6.8	11.0	62
18-24 years	2.3	4.5	96

Sources:

U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 321, November 30, 1965, and Series P-25, No. 381, December 18, 1967. 1985 estimates refer to Series B projection.

Growth in school age population alone, even without improvements in educational standards or in the proportion of the population who were enrolled in educational institutions would lead to large increases in requirements for schools, teachers, and educational facilities of all kinds. In an earlier study, it was estimated that between 1962 and 1975 population growth would require an increase in expenditures for education amounting to $10 billion a year by the mid-1970's (in 1962 dollars). (2) The greatest percentage growth is expected to take place in the 18 to 24 year age group, the group attending colleges and universities. Since per student expenditures and capital outlays are considerably larger in higher than in elementary or secondary education, the sheer fact of growth in numbers will make for a sizeable increase in the nation's resource commitments for education.

Unequal access to education or to employment because of race in the next two decades will affect a larger proportion of the nation's population because of the more rapid population growth among nonwhites in the school-attending age groups or just entering the labor force. From 1960 to 1966, to cite the most recent information, the nonwhite population under 14 grew by 16 percent. The corresponding increase for the white population was 5 percent. (3) The growth rate in the school age population among nonwhites will be close to double the comparable rate for whites in the next twenty years. Population growth in the nonwhite population will make the critical issues in inner city education, e.g., decentralization of decision-making, more acute in the 1980's than in the 1960's.

Education in the United States is very largely concerned with the young, with persons in the 5 to 24 year age group. Yet by 1985 some 25 million Americans are expected to be 65 years old or older, and medical advances may well increase this number. For many of the aged, leisure is enforced by retirement practices intended to enlarge the employment options of younger workers rather than by the choices of the persons who are retired. Far greater provision for part-time employment would make leisure more rewarding for persons who are called upon, frequently at an arbitrary age, to commence enjoying a way of life radically divorced from their earlier existence. For the aged as a group, as for other adults, there is virtually no educational system. The needs of the aged for meaningful leisure, like the needs of younger persons lacking in job skills, can be expected to increase the urgency for planning to transform the schools into community lifetime learning centers for all age groups.

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(2) Lecht, Leonard A., Goals, Priorities and Dollars, op. cit., Table 1-2, p. 36.

(3) U.S. Bureau of the Census, Current Population Reports, Series P-25, November 18, 1966, p. 6.

Urbanization

Megalopolis has long since moved from the realm of science fiction to the realities of city planning. With this change, the process of urbanization has produced a style of life unique to itself, a style which can be described as "urbanism".

Urbanism refers to a pattern of social organization made up of two elements - suburb and central city. "Soil and cement, land and pavement, lane and street" differentiate the two environments. These physical differences are increasingly coming to refer to two different subcultures. Since World War II, the suburbs have become the enclaves of middle-income white families seeking to escape from the tensions of the inner city to an environment more conducive to a life style emphasising the virtues of consumption and material success. Upper income families have tended to remain in the central city along with single people, childless couples, older persons, and a growing number of nonwhites. Thus, five out of eight of the additions to the central city population in the 1950's were whites. Only one in 25 of the new suburbanites were nonwhites. (4)

The city has become home for the poor, the discriminated against, the adventurous and the dissident, and those with sufficient means to maintain the traditional urban way of life in the midst of the massive poverty and social disorganization surrounding them. Slum housing, crime, delinquency, civil disorders, and inadequate schools and public services have become the characteristic social stigmata of the inner city.

With the bifurcation of the metropolis into central city and suburb, the nature of the challenge to urban education undergoes a fundamental change. The suburbs become the pace setters for the elementary and secondary educational systems, the base for the "good" schools supported by communities acutely aware of the close association between education, occupation, and middle-class status. Education in the inner city comes to be widely regarded as the strategic institution in overcoming the initial handicaps of poverty and cultural deprivation, and for eliminating the lack of skills and functional literacy which perpetuates poverty. While the responsibilities of the urban schools become much greater, they remain with much the same types of teachers, curriculum, bureaucratic organizations, school plant, and technologies as before. At the same time, the means available to the inner city school systems from local resources diminish as the exodus of the middle class white population and of many businesses to the suburbs erodes their tax base.

Almost all of the population increase in the next twenty years will occur in one or the other component of the urbanized areas. The separation of the metropolis into central city and suburb will define the social context in which most Americans receive their education in the coming decades.

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(4) Derived from Our Nonwhite Population and Its Housing, Housing and Home Finance Agency, 1963, p. 24.

The role of the schools in the central city will, to a large degree, be determined by the capacity of the educational system to respond to the challenges of changing race relations, the nation's greater concern with poverty, and the widespread urban physical and social decay.

Mobility

Even more than in the 1960's, the American society of the 1970's and 1980's can be expected to stress the loosening of ties which bind persons to a specific place, family, job, or social status. For all socio-economic groups, approximately two-thirds of the family heads live during their lifetime in areas other than those in which they were born. The movement of low-income persons from rural areas, and especially of nonwhites from the rural south to urban areas has exported rural poverty to the cities, and it has made the problem of race a national rather than a southern problem. This movement has been so marked that by the mid-1970's 85 percent of the Negro population is projected to be living in cities. (5)

Social mobility is as characteristic of American society as physical mobility, and both often change together. Along with imparting attitudes, skills, facts, and understanding, the schools also serve as a major vehicle in increasing or diminishing the chances for individuals to become upwardly mobile. Today, according to Ralf Dahrendorf, "the school has become the first and, thereby, decisive point of social placement with respect to future social security, social rank, and the extent of future consumption chances...It is the process of socialization itself, especially as formed in the educational system, that is serving as the proving ground for ability and, hence, (as) the selective agency for placing people in different statuses..." (6)

Upward mobility based on educational attainment has created a new social stratum, the "meritocracy". This stratum is made up of scientists, technologists, physicians, management specialists, higher civil servants, and many others who occupy a strategic economic and social position because of their possession of specialized occupational skills based on the completion of a college education. Since membership in the meritocracy is based on educational achievement, it is relatively independent of the influence of ownership of capital or family status, the typical prerequisites for membership in other high status groups. Along with the greater equality of opportunity implied by the growing importance of this stratum, the rise of the meritocracy accentuates the association between education, occupation, and social position.

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(5) National Planning Association, Regional Projections to 1976, 1962, p. 181.

(6) Dahrendorf, Ralf, Class and Class Conflict in Industrial Society, 1967 ed., p. 59.

As social status becomes dependent on education, the "left out" groups educationally also become the "left out" groups in terms of socio-economic status. The modern communications technologies develop an increasing awareness in the socially non-mobile groups of their relative status in the larger society. In the next twenty years, as educational policy becomes more heavily involved with the problems of the urban ghetto and the rural poor, it will need to distinguish between what are the "class" and what are the "caste" dimensions of social mobility. Class barriers in the United States have historically been successfully, if imperfectly, overcome by education and by economic growth. Measures for improving the economic status of Negroes and other nonwhites by improving educational opportunity are likely to prove unsuccessful unless they are accompanied by corresponding changes in the less readily surmountable caste, i.e., racial, barriers of discrimination, segregation, and prejudice. Since the caste barriers derive their strength from the attitudes of the white majority, eliminating the role of race in perpetuating social immobility will be as much a problem in changing the attitudes of the white majority as it is a question of instituting educational programs to upgrade the literacy or occupational preparation of the nonwhite minority.

The Role of the Self-Concept

The concept of self, and the educational and occupational aspirations which develop out of this concept are a major element in accounting for differentials in educational and occupational achievement. The Coleman Report, to cite one important recent study, concluded that:

> "A pupil attitude factor which appears to have a far stronger relationship to achievement than do all the 'school factor (s)' together is the extent to which an individual feels that he has some control over his own destiny." (7)

Low levels of educational aspiration, like low levels of family income, help explain the statistic indicating that in the mid-1960's only 13 percent of the young people from families with annual incomes under $4,000 went on to college as compared with 47 percent of those who came from families with incomes above $7,500. (8) Low aspiration levels are also partially responsible for the high rates of joblessness and the seeming unemployability of many of the able-bodied men in the central city slums. Many of the hard-core unemployed in this group, according to reports cited in the 1968 Manpower Report of the President, are "less motivated to work, lack perseverance in working, and are generally alienated from the world of work." (9)

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(7) Coleman, James, Equality of Educational Opportunity, U.S. Office of Education, 1966, p. 23.

(8) Toward Full Employment, Report of the Subcommittee on Employment and Manpower, U.S. Senate, Committee on Labor and Public Welfare, 1964, p. 79.

(9) Manpower Report of the President, 1968, p. 86.

While it is difficult to separate out the importance of the self-image from a host of other factors influencing employability, it is apparent that an individual's perception of himself affects his attitudes and motivations and, thereby, his chances of getting and keeping a job.

The self-image held by persons at the bottom of the socio-economic ladder, in turn, reflects the deprivation and frustration which goes along with this social position. This self-image also stems from the expectations of family, the community and the larger society, including the educational system, as to what are feasible aspirations for young persons in the low-status socio-economic groups. Discussing the low level of achievement in ghetto schools, John Niemeyer, President of the Bank Street College of Education states as an "unverified" yet "inescapable" hypothesis that:

> "the chief cause of the low achievement by children in these schools is the low expectation as to their learning capacity held by the professional staff, and a general unwillingness or inability on the part of the school to make the adaptations of curriculum and school organization necessary if the children in these schools are to learn." (10)

The perpetuation of this low self-image, consequently, is a cumulative process in which lack of achievement in school and at work lead to expectations, reinforced by a succession of experiences, of a continued lack of achievement on the part of the individuals who initially lack status, and to similar expectations on the part of those who deal with them as teachers or employers. Consideration of the means for breaking through this chain of self-realizing anticipations would involve an analysis of the institutions which determine what are "reasonable" expectations for the persons in the "left out" groups in American society, and especially for nonwhites.

As a framework for relating the educational system to the formation of the self-concept, William C. Kvaraceus, reporting on a "Workshop on Employment Problems of Negro High School Graduates," cites five factors which are pertinent for future educational policy research. They are:

> "1. I suggest for our purposes (high school education) that one of the most practical categories is in terms of social class.
>
> 2. The educational and psychological needs and interests of boys and girls are significantly different, but are seldom differentiated in your program planning.
>
> 3. Basic to any program for disadvantaged youth is the teacher's perception... "

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(10) Quoted in The Urban R's, op. cit., p. 132.

"4. Most programs that have been developed, particularly in the work-study area, actually degrade the self-concept, for they are dead-end jobs without a career line.

5. We've got to look at the school as a social system." (11)

These five points call for special attention to the relation of the self-concept to class, sex, teacher perception, career development, and the social system itself. Each raises significant questions about the responses of the schools to the socio-economic challenges to education in the next two decades.

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(11) Kvaraceus, William C., "The Negro Self-Concept," Workshop on Employment Problems of Negro High School Graduates, Western Reserve University, 1965-1966, pp. 96-100.

THE EDUCATIONAL SYSTEM'S RESPONSE TO SOCIO-ECONOMIC CHANGE

This chapter is concerned with the responses of the educational system to the problems raised by the anticipated shifts in career opportunities in the next two decades. Many of the potential responses presuppose major changes in institutions other than education, and in the attitudes and social values which influence decision-making in the schools. The vocational education which will be relevant for nonwhites, for example, will depend on the extent to which present discriminatory practices in employment have been eliminated by the 1970's and 1980's. In other instances, i.e., the uses of new educational technology, the degree to which innovations become candidates for widespread use in the classroom will be affected as much by the prevailing concepts of what constitutes "good teaching" as by the technical proficiency of the new technology. In still other areas, the school curriculum in the central cities provides an illustration, the educational system's responses can be expected to reflect the changes which occur in the power structures of the urban communities.

Important decisions affecting education will be made in the coming decade, and they will be influenced by whatever knowledge is available. Consideration of the challenges to education, and indications of the potential responses, can help in choosing among alternatives by underscoring the strategic variables making for change in education. They can develop a way of thinking about educational problems focussed on the process of change, and on the relationship between changes in education and developments in other social and economic institutions. These relationships are illustrated by reference to specific aspects of the educational system concerned with occupational preparation.

Higher Education

Although by 1975 the median educational attainment for persons 25 years of age or older in the workforce is expected to reach only slightly more than 12 years of schooling, a majority of the persons graduating from high school will be receiving some form of higher education. In the mid-1960's, about 44 or 45 percent of individuals in the 18 to 21 year age group were enrolled in colleges and universities. Within another decade, this ratio is likely to increase to approximately 55 percent. (1) This implies a growth in enrollment in higher education rising from 4.5 million in 1964 to between 9½ and 10 million by 1975.

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(1) Derived from U.S. Department of Health, Education, and Welfare, Trends, 1965 ed., p. S-46.

Mass higher education on this scale is a new and unique experience. It is approximated by few other nations, with the Soviet Union probably the contemporary runner-up. Higher education of these dimensions represents more than growth in numbers alone. The increase in enrollments is associated with a shift in the social groups being educated, in the kinds of institutions they attend, in the curricula pursued by the students, and in the values attached to higher education in the social and occupational structures the students enter after leaving school.

Mass higher education is closely related to occupational considerations as well as to the desire for general education. The role of higher education in preparing individuals for careers as doctors, teachers, or engineers is readily apparent. It is less generally recognized that a large majority of the persons who have received a college education make use of it in their employment. According to a recent survey by the Department of Labor, almost 80 percent of the persons who had completed 3 or more years of college held positions related to their college majors. While the proportion was highest in the health fields, over 90 percent, roughly two-thirds of the employed persons surveyed with majors in the social sciences and the humanities were also making use of their majors in their current employment. (2) The English major employed as an editor in a publishing house, the engineering major teaching high school mathematics, or the former student of psychology engaged in personnel work illustrate the range of choices involving the use of higher education as a basis for employment.

The rapid growth of community colleges illustrates the changes in educational institutions which stem from the spread of mass higher education. Much of the expansion of the community and junior colleges is attributable to the recent shift in occupational preparation from non-theoretical skill training to programs combining basic education with scientific and technical studies. These colleges typically offer a curriculum combining studies in science, mathematics, and applied technology with courses in English, other humanities, and the social sciences. They offer two years of low-cost general education to students who cannot afford, or who are unable to qualify for, or are uncertain as to whether they desire four years of college education. The community colleges increasingly concentrate on supplying preparation in technician occupations, as medical, engineering, or electronic technicians, and in semi-professional fields such as the graphic arts. They are areas which are expected to undergo some of the most rapid growth in career opportunities in the next ten or twenty years.

In 1964, community and junior colleges enrolled nearly one million students in programs geared either for transfer to four-year institutions or immediate entry into the labor market. The American Association of Junior Colleges estimates that enrollment will rise to approximately 3 million before the mid-1970's. (3) This means a rate of increase considerably greater than the roughly 100 percent growth anticipated in all higher education over the next decade. The rapid growth in the junior and community colleges is linked with a demand for higher education by young persons from social strata who, a generation earlier, had not conceived of themselves as candidates for post-high school formal schooling. These institutions often face serious problems in recruiting a collegiate-level staff and in developing a curriculum of college calibre. The prospects for growth in serving a new clientele for higher education should provide a favorable environment for growth in the calibre as well as in the enrollment in these institutions.

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(2) Manpower Report of the President, 1964, pp. 71-72, 259.

(3) See American Association of Junior Colleges, Directory, 1968, p. 7.

Opportunities and facilities at all levels of higher education have increased at an unprecedented pace in the recent past. Enrollment rose from 2.2 million in 1954 to 4.5 million in 1964, an increase of about 100 percent. However, progress has been uneven for different groups, and family socio-economic status and race are still important in determining who shall attend college. An increase in enrollment in higher education to close to 10 million by 1975 would again involve more than a doubling of the college population. Population growth alone in the college age group could be expected to account for about 2 million of this increase. Greater public and private commitment to measures for reducing, if not eliminating, the role of family socio-economic status and race would be the major sources for the additional enrollment growth.

Currently, 90 percent of the boys and 75 percent of the girls from families with high socio-economic status who are in the highest ability quartile in their high school graduating class go on to college. Only about 50 percent of the boys and 25 percent of the girls who are in the corresponding quartile from families with low socio-economic status continue on to college. (4) Similarly, in 1965, 5½ percent of the nonwhites who were at least 25 years old were college graduates. Nearly 10 percent of the white persons in this age group had graduated from college. (5) If enrollments in higher education are to grow by substantially more than population increase in the college age group over the next two decades, the bulk of the increase must come from the groups which are now under-represented because of their race or their economic status.

Occupational Preparation for the Non-Collegiate Population

While a much larger proportion of high school graduates enter college than was the case a generation ago, they still represent only slightly more than a third of the members of their age group who first began school. (6)

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(4) Sewall, W., and Shah, V., "Socio-Economic Status, Intelligence, and the Attainment of Higher Education," Sociology of Education, Winter, 1967, pp. 13ff.

(5) Annual Report of the Council of Economic Advisers, January, 1966, p. 108.

(6) Bushnell, David S., and Morgan, Robert M., "An Educational System for the 1970's," in Occupational Education: Planning and Programming, Stanford Research Institute, 1967, p. 113.

Even with the doubling of college enrollments projected for the next decade, nearly three-fourths of the employed civilian labor force in 1975 will be made up of persons whose education consists of four years of high school or less.

Occupational preparation is important for this non-collegiate population because, in part, it imparts skills and training. In an increasingly mobile and impersonal society, it has also become important as a means for demonstrating possession of the entrance credentials needed to qualify for a job. Possession of these credentials, to quote Nils Kellgren, a Swedish labor market authority, has come to mean "placing a label on a person. With this label he is invited to the working life and is accepted." (7)

Occupational training in the United States is provided in a variety of settings. They include high school vocational education courses, company training programs, apprenticeship programs, the armed forces, proprietary business or commercial art schools, and, in recent years, the new manpower programs sponsored by the Federal Government. The nation's job training capabilities, therefore, extend far beyond the established school systems.

The trend toward vocational training in "non-school" agencies, like the occupational preparation in community colleges, can be expected to increase in the future. Table 5-1 describes the growth in enrollment in occupational training outside of the regular school systems between 1950 and 1965, and the projected growth to 1975.

Table 5-1

ESTIMATED VOCATIONAL TRAINING OUTSIDE OF THE FORMAL EDUCATIONAL SYSTEM, 1950, 1965, AND PROJECTED 1975 (a)
(in millions of enrollments)

Type of Institution	Enrollments in		
	1950	1965	1975
Professional and Technical Training	3.5	7.8	20.7
Company Schools	6.0	7.2	19.9
On-the-job Training	2.0	4.5	6.1
Correspondence Schools	1.5	2.4	3.2
Armed Forces	2.0	2.6	3.0
All Others	0.3	0.5	0.9
Total	15.3	25.0	53.8

(a) Historical data from, and projections derived from, Cohen, W.J., "Education and Learning," in Annals of the American Academy of Political and Social Science, September, 1967, Table 2, p. 84.

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(7) Kellgren, Nils, "An Active Labor Market Policy," Memorandum to the Secretary, U.S. Department of Labor, 1963, p. 61.

It is difficult to compare participation in a three-or four-year high school vocational program with participation in the typically much shorter and more casual "non school" agency programs. Yet it is significant to note that enrollment in the federally-aided vocational programs amounted to 5.4 million in 1965 as compared with the 25 million enrolled in the programs outside of the regular educational system. The rapid growth of vocational training outside of the schools increases the choices open to the high schools in deciding how much and what kinds of vocational training they should offer. It also creates opportunities in planning vocational education to relate the preparation for work received in the high schools with the training opportunities available to their graduates after leaving school.

There has been considerable controversy concerning the role, the adequacy, and the objectives of high school vocational education. About two-fifths of the enrollment in the federally-aided programs in 1965 was in home economics, and almost a sixth represented enrollment in agriculture. (8) The home economics courses help young women to become homemakers and this, rather than vocational training, is their primary function. While the enrollment in agriculture has been diminishing as a proportion of the total, the courses in this field, other than in the occupations serving agriculture, constitute preparation for the one major occupational group in which employment is projected to decline. The high school vocational programs, to date, have offered few courses preparing young persons for careers in the emerging occupations connected with the new data processing technology, or in the subprofessional human service occupations in the health, education, and social welfare fields.

After intensive hearings on the relationship between education, technological change, and employment the Senate Subcommittee on Employment and Manpower concluded several years ago that it would be a serious mistake "to concentrate educational resources upon specialized occupational preparation at the high school level." (9) A recent follow-up study of high school vocational education graduates observes that "a clear case cannot be made that vocational education has a direct payoff in the occupational experience of its graduates." (10) The students who had graduated from the vocational curriculum tended to have about the same job satisfactions as the other graduates, and to earn about the same amount of money. Supervisors rated the preparation provided the students in the different high school curricula as about the same.

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(8) U.S. Office of Education, Digest of Educational Statistics, 1966 ed., p. 35.

(9) Toward Full Employment, Subcommittee on Employment and Manpower, Committee on Labor and Public Welfare, U.S. Senate, 1968, p. 78.

(10) Kaufman, Jacob J., et. al., The Role of the Secondary Schools in the Preparation of Youth for Employment; Summary Conclusions and Recommendations, 1967, p. 5.

The questioning and the controversy surrounding vocational education point to the need for new directions in occupational preparation in elementary and secondary schools. Vocational education in the 1970's and 1980's will take place in a society which, even more than in the 1960's, stresses occupational mobility. In the mid-1960's, to cite a recent study, the typical member of the workforce without a college education held 12 different jobs in a 46-year working life beginning with the first position held for at least six months. (11) Already, according to James E. Russell of the National Education Association, "in vocational education we are facing a situation where we cannot tell whether a given form of training will carry a man as much as 10 years in time." (12) The education which is significant for this highly mobile workforce would emphasize increasing the options open to individuals in a changing society rather than providing training for the first or second job.

As the occupational composition of the workforce continues to change in the next 10 or 20 years, the importance of general education as preparation for employment will increase. In the non-professional white collar and the service positions, the major areas for growth in career opportunities for the non-college population, the relevant preparation involves an emphasis on developing a broad base of cognitive, communicative, and social skills, skills acquired through general education. Within industry, automation tends to shift employees' duties from work as operators of machines to work as monitors of complex controls adjusting flows of inputs and outputs. The requirements for employment in these occupations are judgment, reliability, adaptability, and discipline rather than technical expertise.

Much of the rationale for vocationally-oriented education in the future is likely to grow out of its potential as general education. Standard academic subjects will assume a vocational dimension by including occupational information as part of their course content. In Richmond, California, for example, mathematics has come to be taught by job-related examples and problems. Communications skills are related to performance requirements at work. This type of vocationally-oriented general education has a special appeal for students lacking in verbal skills or unmotivated by the standard academic curriculum. Summarizing the Richmond experience, a recent report observes that students who were once judged to be potential dropouts "become, by their senior year in high school, candidates for technical training at nearby junior colleges." (13)

The potentials for redesigning occupational education are illustrated by the current occupational clusters research. In this research, occupations are distributed into related job families involving similar aptitudes and training at different levels of skill, responsibility, and formal preparation. Health occupations, food service occupations, or visual communications occupations compose some of the job families developed in this research. The clusters concept emphasizes the desirability of offering training in a core of generalizable skills rather than for a specific entrance level job. It offers students an orientation to the culture of work along with occupational information and skill training. High school graduates receiving this preparation would be ready to enter a junior college or an industrial training program for additional technical training, to go on to a four-year college, or to take an entrance-level job in industry. The clusters approach lends itself to a curriculum stressing individualized learning through the use of computer-mediated instruction.

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(11) Wilensky, H.L., "Careers, Counselling, and the Curriculum," The Journal of Human Resources, Winter, 1967, p. 32.

(12) The Nation's Manpower Revolution, Hearings, Subcommitte on Employment and Manpower, U.S. Senate, 1963, Part 6, p. 2009.

(13) Bushnell and Morgan, op. cit., p. 119.

The integration of vocational and general education in the future will probably begin in the elementary grades by imparting occupational information to children at the age of six or seven. According to guidance specialists, this information is picked up, in one degree of accuracy or another, by these children from their family or peers, and occupational aspirations and the educational objectives they imply begin to form in the light of the information. First graders, for example, can rank occupations by status about as well as their brothers and sisters who are ten years older.

Education in the Low-Income Urban Areas

Vocational education in the schools concentrates on preparing young people for careers in the more skilled craft, service, and nonprofessional white collar occupations. These programs usually bypass teenagers and young adults from poverty backgrounds. Since few people become employable in occupations other than unskilled labor until they have acquired the rudiments of an adequate education, vocational education is not enough for young persons in the "left out" groups in American society, and when undertaken, it is likely to constitute an incompleted dead end. The remedy for eliminating lack of job skills in the urban slums and the rural pockets of poverty is the development of educational systems, including vocational education content, sufficiently relevant to the needs of their students to attract and retain them through high school and frequently beyond.

While poverty is a national problem, and it encompasses considerable rural poverty, since World War II, "the old, the poor, the discriminated against (have become) increasingly concentrated in central city ghettos." (14) Urban poverty in the United States is closely linked to race and family status. These relationships are summarized in Table 5-2. (See page V-8.)

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(14) President Johnson's 1965 Message on the Cities.

Table 5-2

INCIDENCE OF POVERTY BY RACE AND FAMILY STATUS IN 1964 (a)

Type of Household	Percent of Households with Poverty Incomes
All Households	19.8%
White Households	
male heads	8.1
female heads	31.3
Nonwhite Households	
male heads	28.2
female heads	60.2

(a) Source: Economic Report of the President, 1966, Table 19, p. 113.

The inadequacy of much of the education offered to young people in the central cities reenforces the influence of race and family status in perpetuating poverty. Discussing the calibre of the education in the public schools attended by most Negroes, Kenneth Clark, one of the leading authorities on segregation, comments that, even with minimum requirements in such basic subjects as reading and arithmetic, "as things now stand, the vast bulk of the Negro youngsters from the working class, or the lower middle classes, are unable to meet the ... standards for employment in other than menial, lower status jobs." (15)

Many of the changes considered for the central city schools are primarily technical questions of devising more effective programs for achieving agreed-upon objectives. The proposed Project Follow Through intended to maintain the gains achieved in Head Start after the graduates of this program enter the elementary schools is an example. Other suggested measures concentrate on introducing new technology which has proven effective in experimental situations into everyday use in the classroom. The OEO-sponsored "talking typewriter" projects are an instance. Others single out strengthening the family as the strategic consideration since, to quote the Equal Opportunities Survey, "the influence of school facilities, curriculum, and staff that is independent of family background is small." (16) Still others, i.e., the social critics and civil rights activists, maintain that the problem of education in inner city is not so much a question of which programs or technology to adopt within the schools as it is an issue in changing the distribution of power to make decisions concerning young peoples' life chances.

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(15) Clark, Kenneth, "Social and Economic Implications of Integration in the Public Schools," U.S. Department of Labor, Office of Manpower, Automation, and Training, 1964, p. 6.

(16) Mayeske, G., "Educational Opportunities Among Mexican Americans: A Special Repor from the Educational Opportunities Survey," U.S. Office of Education, 1967, p.9.

At another level, similar considerations have figured in the recommendations of Mayor Lindsay of New York and the recent Bundy study group that the mammoth school systems in the large cities such as New York be decentralized to make them more responsive to local community needs and wishes. These recommendations are now being implemented, on an experimental basis, in several New York City ghetto communities.

The proposals, in effect, make up a cross section of the currents of opinion for coping with the pathologies of American society by utilizing our technological know-how, by allocating more resources to the ghetto schools, and by increasing the role of the families affected by educational decisions in the decision-making process. An indication of the dimensions and the institutional focus of the proposed changes are presented in Table 5-3. (See pp. V-9, V-10.)

This medley of programs and proposals is ultimately directed at changing the learning experiences of Negro children. In kindergarten, Negro children in the urban slums appear as receptive to education as middle-class white children. By the time they have reached the fifth grade, these same children have become sullen, angry youngsters largely impervious to learning within the classroom. By the sixth grade the average Negro child in the metropolitan Northeast is more than 1 and 3/4 years behind the average white child in reading comprehension. Remaining in school until minimum school-leaving age because of legal compulsion, these students drop out "illiterate, untrained, and unmotivated." (17) Leaving school with this kind of learning experience, they become unskilled and frequently casual workers, or they swell the ranks of the hard-core unemployed and unemployables. In 1967, to cite the most recent information, the economy-wide unemployment rate was less than 4 percent. The unemployment rate for 16 through 19 year-old nonwhites ranged, depending on age and sex, between 20 and 32 percent. (18)

To cope with the concentrations of unemployment and lack of job skills in the "left out" groups, a series of new federally-supported education and training programs have grown up since the early 1960's. These programs generally work with, but outside of, the established educational systems. They include the job training and basic literacy education conducted under the Manpower Development and Training Act, the Job Corps, the Neighborhood Youth Corps, the work experience programs for jobless parents of dependent children, and the job creation activities in community service and beautification projects connected with the Community Action programs. The new manpower activities constitute, in effect, a dual vocational education system serving a clientele who, as elementary or secondary students, were scarcely affected by the occupational preparation, and frequently the general education, offered in the schools. The development of this para-educational system, like the introduction of Project Head Start, offers the promise of representing a major source of innovations for American education in the 1970's and 1980's.

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(17) Toward Full Employment, op. cit., p. 80.

(18) Manpower Report of the President, 1968, Table A-13, p. 237.

Table 5-3

INSTITUTIONAL FOCUS OF PROPOSALS TO IMPROVE EDUCATION IN URBAN NON-WHITE LOW-INCOME AREAS

In Teaching and Learning Process within School	In School-Community Relationships	In Locus of Decision-Making Power in Education
individualized instruction through use of new educational technology	transform schools into community learning centers open 16 hours daily	decentralized school boards to choose local superintendent and determine school policy
ungraded elementary schools	recognition of ghetto subculture by training teachers in nonstandard ghetto English	greater participation by parents in formal determination of curriculum and school policy
integrated educational parks in high school education	pay parents stipend while students attend school	organization of ghetto parents as pressure group to change policy
de-emphasis of student grouping on basis of I.Q.	redraw school districts to include greater variety of socio-economic groups	emphasis on hiring nonwhites in administrative positions
teaching of Negro history	bussing of students to achieve greater racial balance	
greater use of teachers' aides		
in-service training of teachers in university urban centers		
expand guidance facilities and re-orient them to ghetto problems		
special cultural enrichment programs		
national teachers corps		

Table 5-3 - continued...

INSTITUTIONAL FOCUS OF PROPOSALS TO IMPROVE EDUCATION IN URBAN NON-WHITE LOW-INCOME AREAS - continued

In Para-Educational System	In Family	In Labor Market
expansion of OEO and MDTA programs to teach basic literacy and job skills to adults	use of neighborhood workers as interpreters between school and family	de-emphasis on tests and formal educational requirements in hiring
use of "sheltered workshop" approach in teaching socially, as well as physically, handicapped	major expansion of social service resources for ghetto families	raise students' vocational chances and aspirations by removal of barriers to union admission and by compensatory hiring
tax-subsidies to firms participating in on-the-job training programs	"community psychiatry"	government as "employer of last resort" to eliminate heavy concentration of unemployment, and accompanying social disorganization, among nonwhite males
removal of barriers to entry of nonwhites into apprenticeship programs	family allowances system in place of present public welfare assistance	
	community clinics to encourage birth control	

Within the regular school systems in the central city, implementing proposals for reconstructing vocational and general education will involve large increases in expenditures to narrow, if not reverse, the gap between the resources allocated to the ghetto schools and those available in the suburbs. This need has been partially recognized by recently enacted legislation such as the Elementary and Secondary Education Act. However, increasing the financial resources on hand for introducing new programs is only a first, although a necessary step, in transforming the inner city schools. Also important are changes in the education of teachers, changes likely to be facilitated by the creation of new types of higher education institutions oriented to the needs of the urban communities in much the same way that the land grant colleges of an earlier period served the rural population.

In the past, and probably to a considerable, although lesser extent in the present, elementary and secondary school teachers have been drawn, by and large, from roughly the same social strata as policemen, firemen, and lower-ranking civil servants. The teaching profession has historically represented a channel for upward social mobility for persons with lower middle class and upper working class backgrounds. While there are many dedicated persons teaching in the schools, considerations of a "good" class, and a pleasant working environment loom large in the expectations of teachers who look forward to the prospect of a career within the existing system. Arriving in the urban slum schools, these teachers find their fears and their prejudices confirmed as they attempt to teach what they have learned in the standard education courses to their unruly and unmotivated charges.

Innovations introduced within the existing schools mean change within an established social system. Change and trouble are frequently synonymous since they threaten to upset the established expectations in a bureaucratic organization. With many individual exceptions, school personnel are inclined to prevent or slow down change so that innovations introduced with high hopes, such as the Higher Horizons program in New York City, tend to become diluted or disappear after a few years.

Breaking through these circumstances will involve educating a different type of teacher endowed with new skills and social awareness. Some of the new teachers would be idealistic young persons attracted to an expanded National Teacher Corps, a domestic equivalent of the Peace Corps. Many others would be drawn from the same groups as at present but they would be involved in a different type of educational experience. To develop this kind of education, the Federal Government would subsidize the establishment of urban colleges and universities in each of the large metropolitan areas. These schools would focus their research on urban problems. They would educate a corps of "urbanologists", persons in a variety of professions who were concerned with revitalizing the cities -- teachers, planners and architects, specialists in municipal finance and in manpower problems, public administrators, community organizers, writers and artists, and others. The urban schools would combine teaching and research with an emphasis on extension programs to improve urban life. Would-be teachers in these schools would study sociology, social anthropology, and the fundamentals of social work to about the same extent as they enrolled in education courses. As part of graduation requirements, the future teachers would participate in the urban extension programs. Their activities might consist of helping to implement Model Cities programs, in tutoring ghetto children, serving as aides to social workers or in the municipal courts, or working as organizers in efforts to encourage self-help and community action programs. The students graduating from this type of curriculum would combine the traditional skills of the classroom teacher with the insights of the social anthropologist, and the skills which have proven effective in professional community organization and social service work. In time, training teachers in this way would provide an important spur to increased receptivity to change within the school systems.

In an earlier generation, critics of American education such as George Counts raised such questions as "Can the schools change society?" In the different context of the 1960's, we are again calling on the schools to change society. This is much of the significance of the concern with urban education. The demands for greater relevance in the inner city schools grow out of the discontent of the inhabitants with their economic and social status coupled with the belief that more effective formal schooling would lead to the eagerly sought for changes in status. Yet Count's question might be rephrased as "Can society change the schools?" The kinds of schools which offer promise to the central city population would represent far-reaching departures from present arrangements in terms of staff, curriculum, decision-making, and resource requirements. Introducing these departures, and providing the financial resources to support them, would involve equally significant political and social choices.

8

THE NEW EDUCATIONAL TECHNOLOGY: A CASE STUDY IN INSTITUTIONAL RESISTANCE TO CHANGE

Educational Technology and Social Systems Analysis

The responses of the educational system to the socio-economic challenges considered in this report can be illustrated by recent developments in the utilization of the new computer-oriented technology and educational television. These developments indicate that the social organization of the educational system is a critical variable in assessing the responses of the schools to socio-economic change. It is also apparent that the challenges impinging on education from the larger society over the next ten or fifteen years will encourage many innovations in the schools including widespread use of the new technology.

We think of ourselves, and with reason, as the world's most advanced industrial and technological society. Advances such as the computer and atomic energy have led to general acceptance of the idea that technological progress is inevitable, and that the rate of progress will dramatically speed up in the future. Technological change has transformed many industries, created the modern metropolis, and it has sharply increased the standards of living and leisure enjoyed by most Americans. On the basis of this experience, it appears reasonable to expect that one of the "spill-over" effects of rapid scientific and technical advance in so many areas would be to generate the new types of technology which would prompt comparable progress in education.

Much of the discussion of technological change in education has been associated with the effort to organize educational planning in terms of systems analysis. There is considerable evidence to support the contention of the educational systems analysts that the new technology must be regarded as part of a total teaching situation. In the late 1950's and early 1960's, many firms developed an interest in selling the "hardware"-- the computer services and teaching machines -- in what was expected to become a rapidly growing educational market. However, the "software" -- the programs fed into the machines -- were frequently lacking in educational content. School buildings or classrooms were seldom planned to take into account the requirements of the new technology. For example, few schools have been designed to include rooms with the cubicles providing individual access to automated teaching equipment. Since some of the major elements in the system were incompatible with others, the lack of appropriateness in the mix of components helps to explain why the system fell short in receiving the mass acceptance which had been anticipated.

The systems concept, as utilized by the educational systems analysts, leads to an emphasis on technique as the critical problem in planning to introduce new technology into the schools. With the design of an appropriate combination of hardware, software, teachers, and school plant, the superior effectiveness of the computer-based instruction in achieving agreed-upon objectives would result, it is believed, in its general acceptance in American education.

While the retarding factors inhibiting technological progress include many of the elements pointed to by the systems analysts, this mode of analysis tends to overlook the social context in which decisions concerning the use of new technology in the classroom are arrived at. It overlooks the role of teachers' organizations, certification requirements, the graded classroom method of organizing instruction, the emphasis on uniform salary schedules for teachers, and the prevailing stereotype of what constitutes "good teaching" as forces retarding change within education. These institutional arrangements, and the attitudes which go along with them, exist because of the persistence in the current period of responses which were relevant to the problems or the technology of an earlier generation, and because of the hopes and fears of teachers concerning their professional status. Widespread use of the new instructional systems over the next ten or fifteen years, accordingly, will primarily reflect the degree to which new challenges confronting education lead to changes in institutional arrangements within education. The impact of these challenges can be illustrated by the anticipated shifts in career opportunities, and by the nation's greater concern with education in the central cities.

The Education Industry and the Construction Industry -- A Striking Parallelism

Although the effects of technological advance in the past two decades have been highly impressive, the advances have been unevenly diffused in the different sectors of our society. The bulk of research and development is conducted by industry and, to a lesser extent, by universities and non-profit organizations. However, approximately seven-tenths of the finances in recent years have been provided by the federal government. About nine-tenths of the federal support for research and development in the mid-1960's has represented expenditures related to defense, space, and atomic energy. Other than these three areas, health-related research has been the largest recipient for federal funds. (1)

The industries which have been the leading beneficiaries of this massive federal support have been in the forefront of the growth industries since World War II. The aerospace and electronics industries are the leading examples. Federal support for research has also been a major element in transforming universities from institutions largely devoted to teaching undergraduates into "multiversities" called upon to bring their expertise to bear in expanding the frontiers of knowledge and in seeking solutions to a host of national problems.

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(1) U.S. Department of Health, Education, and Welfare, Trends, 1964 ed., p. 118.

Many sectors of the economy have been far less involved in the "research revolution" of the past twenty years than the aerospace and electronics industries, or higher education. While technical progress has been influenced, and often substantially so, by large-scale support for research and development, the availability of funds is seldom sufficient to assure technological advance. The residential construction industry serves to illustrate the role of resistances within an industry in retarding the pace at which innovations are introduced into everyday use.

There are a number of new products and processes, all technically feasible, which could increase the efficiency and reduce the cost of building a home. They include use of plastics and other synthetics as surface coverings, or for pipes and panels. Aluminum can be substituted for many of the traditional building materials. So far, prefabricated housing has met with limited success although there has been important progress in making use of prefabricated components which are assembled on the building site.

Research and development expenditures within the residential construction industry are relatively small. However, the institutions which affect the industry are an even more important factor tending to discourage technological advance. Building codes enacted into law in American cities often rigidly specify the permissible building materials and standards for construction. The specifications frequently reflect the technology of an earlier period, and, for this reason, they make it difficult to use the new materials in home building. The building trades unions are a major influence in residential construction. The unions, in many instances, have regarded the innovations as threats which could reduce the work available and the earnings of their members and, consequently, the strength of the unions and the power of the leaders. Opposition by the building trades unions, for example, has been a major element in retarding acceptance of a plaster gun which would enable a crew to double the amount of plaster applied in a day.

The educational system in the United States, in terms of its receptiveness to technical advances, has had more in common with the residential construction industry than with the aerospace and electronics industries. As in the home building industry, institutional barriers serve to inhibit innovation. Like residential construction, spending for research and development, while it has been increasingly significant in the recent past, is still low in comparison with the technologically advanced industries.

Barriers to Innovation Within the Educational System

Institutional barriers to change make up only one element, although an important element, in the complex of factors influencing innovation in education. Along with the resistances to change, there is also ample evidence of receptivity to change as in the recent acceptance of the "new math," the "new biology," and in the use of language laboratories. The innovations linked with the computer technology or educational television have been less successful, up to now, in securing acceptance because their adoption, in many instances, would involve more far-reaching changes in the organization of the educational system, in physical facilities, and in existing attitudes.

Elementary and secondary education in the United States is largely organized around a system of graded classes. This system, imported from Germany in the nineteenth century, was adopted in American cities as a workable solution to educational problems in a situation in which there were few well-trained teachers, and large masses of students, often from widely varying cultural and national backgrounds. The social objective of much of the urban education in this period was to "assimilate" the students to the majority culture -- to teach them the rudiments of the English language or arithmetic, to inculcate allegiance to the nation through courses in history and civics, and to prepare young persons to become productive employees in what was rapidly becoming one of the world's great industrial societies. What was originally a convenient administrative device for achieving these purposes became, in time, a mechanism around which teaching and learning were organized.

The rationale of graded classes loses much of its purpose in the computer-oriented instruction. One of the major advantages of the new teaching system is the greater possibility it creates for encouraging individual students to proceed at their own pace rather than covering a designated body of subject matter which is deemed appropriate for a class in a particular grade and "track". Recent developments associated with John Goodlad have reorganized elementary and junior high schools along an ungraded pattern, again to allow each student to make progress at his own rate. (2) While ungraded schools are not required to make effective use of teaching machines, they lend themselves readily to its basic advantages. Diminishing the importance of graded classes as the framework for organizing instruction can be expected to increase acceptance of the new educational technology.

Similarly, the standard "egg crate" 30-students-to-a-classroom organization in high school bears little resemblance to the classroom and class size requirements for the audio-visual technology which typically is used in conjunction with the computer-based instruction. Teaching and learning by means of television can take place in large auditoriums, in study cubicles, or in dormitories and at home. A common proposal for utilizing this technology is to provide large group instruction for the televised performance combined with small seminar-type discussion groups and individualized instruction.

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(2) See Finn, James D., and Ofiesh, Gabriel D., "The Emerging Technology of Education," in Educational Implications of Technological Change, Appendix Volume IV, Technology and the American Economy, National Commission on Technology, Automation, and Economic Progress, 1966, p. 41.

Educational television is inherently structured to make effective use of team teaching. The teams would include a master teacher who was responsible for the televised performance together with other qualified teachers who led the discussion groups and the individual instruction. The compensation and status of the master teacher in this arrangement would very probably be greater than the compensation or status of his colleagues. Yet, more than most professions, teachers have sought to safeguard their independence within a bureaucratic system of organization by establishing uniform salary schedules for teachers possessing the same level of educational attainment with salary increments based on an objective criterion, usually length of service, rather than on an evaluation by their superiors. The inadequate earnings and lack of professional opportunities for fulfillment which are encouraging teachers to join unions, and professional organizations to take on collective bargaining functions, are likely to accentuate the tendencies toward unformity of compensation. These tendencies, once built into the educational system, retard introduction of the team teaching which would facilitate the adoption of such devices as educational television.

Many of the persons in the new teaching teams would be teachers' aides. The persons responsible for the functioning of the teaching machines and for routine checking with students would frequently be aides -- persons who would normally not be required to be college graduates or to have completed courses in education. The teacher would serve as a guide and counselor for students, a diagnostician of student needs, an evaluator and selector of programs, a supervisor of assistants, and as a participant in small group and individual instruction.

The teachers' aides have received only limited recognition within education, and their use has been largely confined to clerical and custodial duties. The major barrier to their use, according to a recent conference on nonprofessional human service occupations, has been "professional resistances and fears, legal barriers, and certification requirements." (3) Teachers' associations have sometimes suspected that presence of the aides might be utilized as a basis for increasing class size, or that their use would mitigate teacher shortages and thereby reduce the collective bargaining pressures which have led to improvements in compensation. Certification requirements often rigidly restrict the duties of the aides. For these reasons, teachers' aides are infrequently used, poorly paid, and with little prospects of job stability and promotion.

"Attitudes", according to Sumner Myers, "are a major factor in determining the rate of innovation." (4) Use of the teachers' aides and, more generally of the new technology in education, often runs counter to the attitudes underlying the concept of the teachers' role held by the general public, by many professional organizations and school boards, and, frequently, by teachers themselves. These attitudes center on the student-teacher relationship. The essentials of good teaching, it is widely believed, consist of a close personalized relationship between students and teacher in which both are engaged in a communication process. A close relationship is enhanced by small classes -- a situation which is held to facilitate the formation of values and understanding, as well as to impart skills and knowledge of facts. The impersonal machine or the nonprofessional aide appear to represent an intrusion in this process, an intrusion which in the case of the teaching machine substitutes a robot for the flesh and blood teacher who, in effect, it is claimed, becomes a machine tender. The new machines, as in educational television, also make it possible to utilize larger classes. For the teacher and student, they substitute the computer program or the televised presentation for the book and the printed page which for some 400 years has been the fundamental raw material in teaching.

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(3) Lyndon, Edith F., The Subprofessional: From Concept to Careers, National Committee on Employment of Youth, 1967, p. 142.

(4) Myers, Sumner, "Attitude and Innovation," Science and Technology, October, 1965, p. 91.

The concept of the good teacher as a person communicating with a graded class of twenty or thirty students who learn from class discussions and from texts and library reference materials is reflected in teacher certification requirements and in the training of teachers. While there are many certification requirements for a person planning to teach English or biology involving courses in the relevant subject manner, in how to teach these subjects in the standard classroom using the established methods, or in educational psychology, there are few requirements that the novice teacher be familiar with the new educational technology. There are few methods courses in colleges of education which presuppose educational television, or programmed instruction, or use of automated information systems as the technique of instruction. The students who conform to the prevailing certification requirements or to the content in methods courses are likely to absorb the standard stereotypes as to what constitutes good teaching. The established systems for educating and licensing teachers, consequently, themselves constitute a formidable barrier to innovation in education.

Innovations in education are more likely to become acceptable when they fit in with only modest changes in existing attitudes and institutional arrangements, when the additional costs are small, and when the changes clearly serve to further important educational and social objectives. As the educational system changes in the next decade to provide the kind of education which is relevant in a rapidly changing society, the probabilities are heavily weighted in favor of widespread use of the new technology because it will, to an increasing degree, meet the criteria for its acceptance.

Social and Economic Forces Facilitating the Use of New Technology in Education

The social organization of the educational system, to date, has served to slow down the adoption of innovations such as teaching machines or educational television. Over the next ten or twenty years, however, the social and economic challenges confronting education can be expected to bring about far-reaching changes including widespread use of the new technology. The impact of these changes can be illustrated in terms of the anticipated shifts in the occupational structure and by our society's greater concern with poverty and inequality. Allied with these considerations is a probable decline in the outlays required to utilize the hardware associated with the new technology.

As with many technical advances in other areas, high costs in the early stages of commercial development have discouraged introduction of the computer-based technology in education. The predominance of a few large firms in manufacturing the basic equipment has tended to emphasize maintenance of stable prices rather than keen price-cutting. More recently, new and often smaller firms have been entering the industry, and they have been employing price reductions, and the introduction of less elaborate equipment to establish a foothold in the market. So, a recent report in Business Week on the Spring, 1968, Joint Computer Conference, comments that this meeting "had the aura of a giant discount house, rather than the industry's main technical meeting." (5) The price reductions are frequently attributable to sizeable decreases in manufacturing costs brought about by use of integrated circuits -- tiny semiconductors containing many electronic circuits on a single chip to silicon. To illustrate recent developments by a strong case, one new machine introduced at the conference was a time-sharing system that can handle sixteen different users working at different sites on different problems. The unit was priced at $89,500 compared to $527,000 for the cheapest, but larger and more complex time-sharing system of one of the industry's giants.

It is too early to do more than speculate as to the pace at which the new generation of relatively inexpensive computers, or other advances in educational technology will be adopted by the schools. However, future developments such as the anticipated 100 percent increase in enrollments in higher education in the next decade will make it necessary for colleges and universities to seek new means for reaching far larger numbers of students with limited faculty resources. The pressures arising from rapid growth in enrollment can be expected to encourage large-scale utilization of educational television. Since familiarity with the new technology will constitute an important part of the preparation for many established professions, i.e., medicine or teaching, and since the rapidly growing professions will frequently be those associated with recent technical advances, i.e., systems analysts, keeping abreast of the major developments in technology will constitute a significant aspect of higher education. These considerations are responsible for such current innovations as the planned Learning Resources

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(5) Business Week, May 11, 1968, p. 108.

Center at Northeastern University intended to provide 1,500 individual study carrels with access to automatic teaching equipment and information systems. Similar reasons account for the proposed nationwide educational network, EDUNET, which would tie together computerized television facilities and other electronically generated information from participating universities, non-profit institutions, and government agencies.

Much of current research in vocationally-oriented education is aimed at individualizing instruction to more fully realize students' learning potentials, and to provide greater flexibility for young persons about to enter the labor force or to begin their higher education. The role of technology in this search for new directions is illustrated by the research in the organic curriculum. "The use of instructional television, single concept films, video tapes, teaching machines, and simulators," according to David Bushnell and Robert Morgan of the U.S. Office of Education, will become commonplace as the organic curriculum and similar developments come to influence teaching in the 1970's. (6) The computer simulation games now used in planning business or defense strategies would be employed to teach teenagers to think through career choices and personal adjustment problems. The learning programs which are suited to students with different abilities, school backgrounds, and vocational or other interests would be stored in a computer-based system along with students' test scores and educational histories. On the basis of this information, the computer would recommend a curriculum suited to the individual student.

Guidance counselors currently spend an average of one and a half hours a year with each student. Assisted by the computer systems, the counselors would be freed from the task of dispensing routine information and administering routine tests to concentrate on the diagnosis of problems and to prescribe individual programs. Computer technology in this system would serve as an aid to the counselor and teacher in much the same way that physicians are beginning to make use of medical histories stored in computer memory systems, and with computer diagnosis as an aid to the physician's skill in medical diagnosis and prescription of treatments.

The search for relevance in the central city schools in the 1970's and 1980's will encourage innovation in all aspects of education. The greater receptivity to change brought about by this search is creating an environment conducive to the development of new instructional media. As part of this process, the urban schools will increasingly make use of advances in educational technology, advances often initially introduced outside of the regular educational system. The "talking typewriter" projects sponsored by the Office of Economic Opportunity illustrate new approaches utilizing computer-based instruction in teaching literacy to children which are likely to influence standard classroom procedures in the coming decades.

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(6) Bushnell and Morgan, op. cit., p. 115.

Project Breakthrough in Chicago offers an example of these developments. The pre-school children who participate are bussed from housing projects to a nursery classroom for one and a half hours daily. Each day the children are invited to come to the lab area and work with a talking typewriter, either a computerized or a non-automated unit. The typewriter is designed to utilize the pupils' sense of touch, sight, and hearing as they explore the typewriter and it responds verbally. The children learn to locate each letter, to put the letters together into words, then sentences, and finally to make up their own stories. In this way, the participants are encouraged to develop their senses and perceptions, to increase their verbal skills, to develop concept formation abilities, and to improve their self-image. Teen-age girls from poverty neighborhoods have been trained to serve as nursery teachers' aides in the program.

The talking typewriter and similar innovations illustrate experiments which are still very much in their infancy. These and other technical advances are more likely to be adopted in the 1970's and 1980's than in the 1960's because the socio-economic challenges to education cannot be resolved without a major dilution, or disappearance, of many of the present institutionalized resistances to change within the educational system. With the barriers diminished, the new educational technology can have an important role because of its capability for enhancing our responses to deep-seated and sometimes seemingly intractable problems. In furthering the design of the teaching systems of the future, technology serves as a means rather than as an end. How rapidly, and to what extent, the computer-based instructional media and educational television are adopted will depend on the degree to which they are successful in developing the potentials of students as persons, and as participants in the labor force and the larger society.

APPENDICES

Appendix Table 1

Expenditures for Individual Goals, 1962, and 1975
(in millions of 1964 dollars)

Goal Area	Expenditures in 1962	Projected Expenditures for Aspiration Goals in 1975
Agriculture	$ 7,350	$ 9,300
Area Redevelopment	350	1,000
Consumer Expenditures	364,750	674,400
Education	31,150	85,950
Health	34,000	89,800
Housing	30,850	65,000
International Aid	5,550	12,550
Manpower Retraining	100	3,050
National Defense	53,750	70,700
Natural Resources	6,050	17,100
Private Plant and Equipment	50,050	155,050
Research and Development	17,350	40,000
Social Welfare	39,050	94,400
Space	3,400	9,550
Transportation	35,950	76,650
Urban Development	67,700	136,700
Gross Total	747,400	1,541,200
Minus Double Counting and Transfer Adjustments	174,100	379,600
Net Cost of Goals	573,300	1,161,600
GNP	573,300	1,010,000

Appendix Table 2

Estimated Manpower Requirements for Individual Goals, (a)
1962 and Projected 1975
(number in thousands)

Goal Area	1962 Number	1962 Rank	Projected 1975 (b) Number	Projected 1975 (b) Rank	% Increase, 1962 to 1975
Consumer Expenditures	42,489	1	58,649	1	38%
Health and Education	9,069	2	17,140	2	89
Housing	3,425	8	5,422	7	58
International Aid	509	11	812	11	60
National Defense (c)	3,457	7	3,264	9	-6
Natural Resources	652	10	1,201	10	84
Private Plant and Equipment	5,586	4	11,250	3	101
Research and Development (d)	2,259	9	4,295	8	90
Social Welfare	4,593	5	8,395	5	83
Transportation	3,961	6	5,972	6	51
Urban Development	6,336	3	10,160	4	60

Source:
Leonard A. Lecht, Manpower Requirements for National Objectives in the 1970's. Prepared for the U. S. Department of Labor, Manpower Administration. February, 1968.

(a) This table lists only twelve goals for which it was possible to estimate separately the manpower requirements. Because of a basic data problem, the occupational requirements for the health and education goals were treated as if the two were one goal. The estimates for employment include both the direct employment in the industries producing the goods and services each goal requires for its pursuit, and the indirect employment in the industries supplying inputs to the firms producing these goods and services.

(b) Refers to the estimated manpower requirements for the "aspiration" goals (that is, for achieving the standards) in 1975.

(c) Refers to employment generated in industry because of purchases of goods and services for national defense. This includes government employment in the industrial sectors for which there are counterparts in the private economy, i.e., in shipyards, ordnance plants, transportation, etc.

(d) Includes space research and development.

Appendix Table 3

Projected Occupational Distribution of Manpower Requirements for Individual Goals in 1975

Goal Area	Percent of All Occupations						
	White Collar Workers			Blue Collar Workers		Service Workers	Farm Workers
	Professional, technical	Managers	Clerical, sales	Craftsmen, foremen	Operatives laborers		
Consumer Expenditures	12.4%	11.6%	24.6%	10.3%	19.4%	16.6%	5.1%
Health and Education	44.2	2.5	15.6	6.7	8.7	21.8	0.6
Housing	8.2	10.0	14.8	34.0	27.7	3.6	1.7
International Aid	12.9	7.2	19.1	13.9	22.3	4.9	19.7
National Defense	21.9	6.7	16.9	19.0	29.6	4.6	1.3
Natural Resources	15.9	8.3	15.5	21.7	24.8	10.6	3.2
Private Plant & Equipment	13.0	10.6	18.2	21.9	31.6	4.2	0.4
Research & Development	36.4	6.0	14.1	13.1	25.5	4.4	0.5
Social Welfare	17.1	10.5	23.0	9.0	17.2	17.0	6.3
Transportation	10.3	10.3	18.2	23.6	32.2	4.5	0.8
Urban Development	9.1	11.0	17.0	29.4	28.3	4.0	1.2

Appendix Table 4

Estimated Distribution of Employment for Individual Goals by Level of Educational Attainment in 1962 and 1975

	1962 Percent of Total Employment with:		Median Educational Attainment (in years)	Projected 1975 Percent of Total Employment with:		Median Educational Attainment (in years)
Goal Area	8 Years of Education or less	4 or more Years of College		8 Years of education or less	4 or more Years of College	
Consumer Expenditures	30.0%	8.6%	11.6	18.3%	11.5%	12.3
Health and Education	19.2	27.4	12.5	11.4	30.2	12.8
Housing	33.5	6.0	11.0	21.7	8.4	12.2
International Aid	38.9	6.9	10.6	23.3	10.6	12.1
National Defense	28.3	9.3	11.8	16.8	13.9	12.4
Natural Resources	31.7	7.8	11.4	18.9	12.6	12.3
Private Plant and Equipment	29.8	8.0	11.6	18.5	10.9	12.3
Research and Development	22.4	18.9	12.3	13.5	21.4	12.6
Social Welfare	29.1	10.3	11.8	17.4	15.0	12.3
Transportation	30.2	7.3	11.4	19.4	9.5	12.2
Urban Development	31.7	7.4	11.3	20.7	9.4	12.2

Appendix Table 5

Estimated Distribution of Employment by Specific Vocational Preparation (SVP) Category in 1975, for Individual Goals

Goal Area	Up to 3 Mos. (1)	Over 3 months and up to 6 mos. (2)	Over 6 months and up to 1 year (3)	Over 1 year and up to 2 years (4)	Over 2 yrs. and up to 4 yrs. (5)	Over 4 years (6)	Average years of SVP
Consumer Expenditures	22.2%	24.1%	15.8%	6.9%	24.5%	6.5%	1.5
Health and Education	16.3	19.0	3.1	16.6	36.4	8.6	2.1
Housing	15.9	20.0	10.6	7.8	29.0	16.7	2.3
International Aid	18.4	28.5	11.7	8.7	23.7	9.0	1.7
National Defense	14.4	24.8	2.8	11.5	29.0	17.5	2.4
Natural Resources	17.9	20.7	10.1	7.7	32.2	11.4	2.1
Private Plant and Equipment	13.3	27.6	5.3	11.6	28.8	13.4	2.1
Research and Development	9.8	24.0	2.4	9.0	35.5	19.3	2.7
Social Welfare	20.6	24.0	13.2	8.5	28.0	5.7	1.6
Transportation	13.4	26.1	7.1	11.7	33.6	8.1	1.9
Urban Development	14.5	24.8	8.8	7.7	30.1	14.1	2.1

Appendix Table 6

Average Annual Percent Rates of Change, Selected Economic and Demographic Indicators, 1948-1965 and 1964-1985

Indicators	1948-1965	1964 - 1985 Moderate Productivity Growth	1964 - 1985 Rapid Productivity Growth
Population	1.7%	1.5%	1.5%
Total Labor Force	1.3	1.6	1.6
Total Employment	1.2	1.7	1.6
Average Weekly Hours of Work	-0.4	-0.4	-0.6
Total Manhours	0.9	1.3	1.0
GNP	3.8	4.3	4.7
GNP per Manhour	2.9	3.0	3.6

Appendix Table 7

Distribution of Employment by Level of Educational Attainment, 1964 and Projected 1975

		Percent Distribution of Employment				
	Total	8 years or less	1-3 years high school	4 years high school	1-3 years college	4 or more years college
Base Year 1964						
White Collar Workers	100.0	8.3%	10.9%	40.4%	16.9%	23.5%
Professional, technical and kindred workers	100.0	2.1	2.8	17.9	17.9	59.2
Blue Collar Workers	100.0	34.8	27.1	31.7	5.2	1.2
Service Workers	100.0	37.6	25.3	28.9	6.8	1.4
Farmers and Farm Laborers	100.0	56.9	16.3	20.4	4.2	2.2
Total Employment	100.0	24.1	18.8	34.7	10.7	11.7
Projected Year 1975						
White Collar Workers	100.0	3.7	9.3	40.1	17.5	29.4
Professional, technical and kindred workers	100.0	0.7	2.8	17.7	16.6	62.2
Blue Collar Workers	100.0	25.3	25.9	41.1	6.4	1.3
Service Workers	100.0	24.9	26.2	38.2	9.2	1.5
Farmers and Farm Laborers	100.0	48.8	14.7	30.1	4.1	2.3
Total Employment	100.0	15.7	17.5	39.8	12.1	14.9

Appendix Table 8

Advisory Panel for *The Implications of Social and Economic Changes for Educational Policy in the Next Two Decades-A Pilot Study*

William Amos
Director, Division of
Counseling and Testing
U.S. Employment Service

Irwin H. Billick
Science Policy Research Center
Library of Congress

John Caffrey
American Council of Education

Professor Robert D'Arista
Department of Art
American University

David Darland
National Education Association
Antioch-Putney Project

Rt. Rev. Msgr. Eugene Kevane
Dean, School of Education
Catholic University

Professor Sar Levitan
Center for Manpower Policy Study
George Washington University

Professor James McClellan
College of Education
Temple University

Sumner Myers
Institute of Public Administration

Professor Leon Ovsiew
Assistant Dean for Research
College of Education
Temple University

Professor David Rogers
Center for Urban Education
New York University

Seymour Rubenfeld
Clinical Psychologist

Harvey Segal
Economics Editor
The Washington Post

Sidney Sonenblum
Director, Center for
Economic Projections
National Planning Association

James A. Suffridge
President, Retail Clerks
International Association

Professor Robert E. Taylor
Center for Vocational and
Technical Education
Ohio State University

J. Lloyd Trump
Associate Secretary
National Association of Secondary
School Principals

Appendix Table 9

Involvement and Consultation

The interdisciplinary and interagency nature of educational policy research was recognized through numerous consultations with representatives of professional associations, training facilities, Federal agencies, private agencies and other research facilities. The primary purpose of these contacts was to identify activities and experiences that were appropriate to the problems being studied by NPA.

The following contacts were of great help in the pilot study:

Professional Associations

American Vocational Association - Lowell Burkett, Executive Director
Mary Ellis, Director of Field Services and Program Development
Participant in National Convention, Cleveland

National Vocational Guidance Association - Henry Borow, President

Adult Education Association of the U.S. - Hugh S. Pyle

American Association of Junior Colleges - William Shannon, Assistant Director
Jane Matson, Director of Counseling and Pupil Personnel Services
Lewis R. Fibel - Vocational and Technical Education Project Director
Dorothy Knoell - Special Manpower Project Director

Urban League - Sterling Tucker, Executive Director

National Education Association
Staff of Project on Instruction
David Darland, Editor, TEPS Journal
James Perin, Research Personnel

Training Institutions

Office of Economic Opportunities - Job Corps
Benetta Washington, Director of Women's Job Corps
Dr. Will Darnell, Director, Research Division

National Association of Business Schools
Richard Fulton, Executive Director

National Home Study Council
Richard Fowler, Assistant Executive Director

National Association of Trade and Technical Schools
William A. Goddard, Executive Director

Appendix Table 9
(continued)

Federal City College
    Robert Calvert, Dean, Pupil Personnel Services

Other Research Agencies

Stanford Research Institute - Charlton Price

Western Behavioral Sciences Institute - Richard Farson

Northwest Regional Laboratories - William Ward

Private Agencies

IBM - Martin Gerra, Phillip Lever, Charles Meadow

American Telephone and Telegraph - Charles Sherrad

Responsive Environments Corporation - Milton S. Katz

National Committee for the Support of Public Schools - Iris Garfield

Government Agencies

NASA - Harry Haraseyko

Office of Education - Division of Vocational Education
    Edward Rumpf, Assistant Director
    Melvin Barlow, Chairman, National Evaluation Panel and Head, Department of Vocational Education, University of California

Manpower Administration, U.S. Department of Labor
    Howard Rosen, Director, Office of Manpower Research
    Joseph Epstein, Chief, Economic Development and Manpower Resources Group, Office of Manpower Research

U. S. Employment Services
    Earl Klein, Assistant Director, Employment Service
    William Amos, Director, Counseling and Test Development